

VOL. 45, No. 5

MAY 1977

CONTENTS

TECHNICAL

Commercial Kinks	18
Improving Power Output of the IC-22	6
Radio Teletype — Part 5	11
Shortened Forty Metre Dipole	9
Technical Correspondence	24
Try This	10

GENERAL

NZART Jubilee VK/ZL/Oceanic	
Contest 1976 — Results	20
The Mt. Ginini Repeater	15

DEPARTMENTS

ATV News	25
Awards Column	25
Contests	24
Hamads	30
IARU News	27
Intruder Watch	27
Ionospheric Predictions	29
LARA	27
Letters to Editor	24
Magazine Index	27
QSP	3, 4, 18, 24
Silent Keys	30
VHF-UHF — an expanding world	22
WIANEWS	4
20 Years Ago	27

COVER PHOTO

Eddie Penikis VK1VP, John Tilley VK1FT and Norm Smith (top to bottom) raise the antenna for the Mt. Ginini Ch. 7 Repeater VK1RGI. The antenna is 3 bays of 4 gamma matched dipoles fed in quadrature and has an omnidirectional gain of 8 dB. See Story on page 15.

Photo by Martin Hood VK1ZME

HAM

RADIO SUPPLIERS

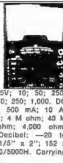
323 ELIZABETH STREET, MELBOURNE, VIC. 3000

Phones: 67-7329, 67-4286

Our Disposals Store at 104 HIGHTET ST., RICHMOND (Phone 42-8136) is open Mondays to Fridays, 9.00 a.m. to 5.00 p.m., and on Saturdays to midday.

MODEL OL64 D/P MULTIMETER. Very ruggedly constructed this model is particularly suitable for workshops. It features special scales for measurement of capacitance and inductance. Diode protected movement.

Specifications: 20,000 ohm/volt DC. 8,000 ohm/volt AC. DC volts — 0.25; 1; 2.5V; 10; 50; 250; 1,000; 5,000. AC volts — 10; 50; 250; 1,000. DC amps: 50 μ A; 1 mA; 50 mA; 500 mA; 10 A. Ohms — 4 K ohm; 400 K ohm; 4 M ohm; 40 M ohm. Centre scale — 40 ohm; 4,000 ohm; 40,000 ohm; 400,000 ohm. Decibel: —20 to +62 dB. Dimensions: 6" x 4-1/8" x 2"; 152 x 107 x 51 mm. Inductance — 0/5000H. Carrying case available. Model C \$6.90.



\$29.90 Postage \$2.20

MODEL CT-500/P MULTIMETER

Of intermediate size, this popular multimeter combines high accuracy with versatility over 24 ranges. Mirror Scale. Diode protected movement.

SPECIFICATION: 20,000 ohm/volt DC. 10,000 ohm/volt AC. DC Volts: 2.5, 10, 50, 250, 500, 5000. AC Volts: 10, 50, 250, 500, 1,000. DC Amps: 0.05 mA, 5 mA, 50 mA, 500 mA. Ohms: 12K ohm, 120K ohm, 1.2M ohm, 12M ohm. Centre Scale: 50 ohm, 500 ohm, 5K ohm, 50K ohm. Decibel: —20 to +62 dB. Dimension: 5 1/2" x 3 1/8" x 1 1/2" inches. Carrying case available. Model B — \$5.80.

Price: \$24.80 — Postage \$2.20.

MODEL AS100 D/P MULTIMETER

This meter features double zero diode meter protection and 3 1/2" full view easy to read 2 colour scale. It is fitted with polarity reversing switch and housed in a strong moulded case with carrying handle.

SPECIFICATION: 1000,000 ohm/volt DC. 10,000 ohm/volt AC. DC Volts: 0.5, 3, 12, 60, 120, 300, 600, 1,200. AC Volts: 6, 30, 120, 300, 600, 1,200. DC Amps: 10 μ A, 60 μ A, 500 μ A, 5 mA, 10 mA, 50 mA, 200 mA, 500 mA, 1 A. Ohms: 2K, 20K, 200, 2M, 20M, 200M ohm. Centre Scale: 30 ohm, 300 ohm, 3,000 ohm, 30,000 ohm, 200,000 ohm, 2M ohm. Decibel: —20 to +57 db. Dimensions: 7-3/8 x 5-2/5 x 2-3/8 ins. Carrying case for model I — \$7.90.

Price: \$52.80 — Postage \$2.20.

KARPACK VOLTAGE ADAPTOR

Operates from car cigarette lighter socket. 12V neg. earth cars only. Output 6V, 7.5V and 9V (switched) to 300 mA max.

\$6.90 — Post \$1.

200-H.

90° quadrant meter. Pocket size.

AC/V: 10V, 50V, 100V, 500V, 1000V (10,000 ohm/V).

DC/V: 5V, 25V, 50V, 250V, 500V, 2500V (20,000 ohm/V).

DC/A: 50 μ A, 2.5mA, 250mA.

Ohm: 50K ohm, 5M ohm.

Capacitance: 100PF to 0.1 μ F, 0.01 μ F to 1 μ F.

dB: —20dB to +22dB.

Audio Output: 10V, 50V, 120V, 1000V AC.

Approx. size: 4 1/2 in. x 3 1/4 in. x 1 1/4 in.

\$16.90. Postage \$1.50.



POCKET MULTIMETER SPECIAL



MODEL C1000M MULTIMETER

Compact, handy and versatile, the C1000M is the ideal low cost pocket meter. Mirror Scale.

Specifications: 1,000 Ohm/Volt. DC: 1,000 Ohm/Volt AC; DC volts 10; 50; 250; 1,000; AC volts 10; 50; 250; 1,000; DC amps — 1 mA; 100 mA; Ohms 150 K Ω . Centre Scale 3 K Ω . Decibel — 10 dB to 22 dB. Dimensions: 3 1/2" x 2 3/8" x 1 1/8". 90 x 60 x 30 mm.

\$9.75

POST \$1.00

CT-500 — \$24.90 — Postage \$2.50

Popular, medium-size, mirror scale. Overload-protected.

AC/V: 10V, 50V, 250V, 500V, 1000V (10,000 ohm/V).

DC/V: 2.5V, 10V, 50V, 250V, 500V, 5000V (20,000 ohm/V).

DC/A: 50 μ A, 5 mA, 50 mA, 500 mA.

OHM: 12K ohm, 120 K ohm, 1.2M ohm, 12M ohm.

dB: 20 dB to +62 dB.

Approx Size: 5 1/2" x 3 5/8" x 1 1/8". P & P \$0.50



YAESU FRG-7

THE RADIO FOR WORLD-WIDE LISTENING AT ITS BEST — 0.5-29.9 MHz COVERAGE SYNTHESIZED COMMUNICATION RECEIVER



The model FRG-7 is a precision built high performance communication receiver designed to cover the band from 0.5-29.9 MHz. Its state of the art technology offers an unprecedented level of versatility. The Wadley Loop System (drift cancellation circuit) coupled with a triple conversion super heterodyne system guarantees an extremely high sensitivity and excellent stability. It provides complete satisfaction to amateurs as well as BCUs with superb performance and many features such as RF attenuator, selectable tone, and automatic noise suppression circuit.

\$328

HIGH QUALITY 3-WAY CROSSOVER — \$9.95

AND 2-WAY NETWORK — \$7.90

D.D.K. CROSS OVER NETWORK:

Imp.: 8 ohm; C.O. Freq.: 800, 4500 Hz; Power Cap.: 70 watts RMS.

Red Dot: Woofer; Orange Dot: Midrange; Blue Dot: Tweeter; Green Dot: Input.

Postage \$1.20

BRIDGE ROAD, RICHMOND STORE SPECIALS

SPEAKER WIRE — 100 metre Rolls
\$11.90 per roll — post free.

WALKIE-TALKIES — 100 Milliwatt

7 Trans. Call Buzzer, Superhet System, BV Battery, PMG approved, 27.240M xial. Complete with booklet. \$52.00 Pair — post free.

INTERCOMS

2 STATION AND 5V BATTERY \$12.80 each
3 STATION AND 5V BATTERY \$18.90 each
4 STATION AND 5V BATTERY \$28.90 each
Complete with 60 ft. wire. Ideal for garage, baby room, etc. — Postage \$1.50.

CB POWER SUPPLY

240V in, 13.8 out, 1 amp continuous.
\$34.00 — P & P \$1.50.

SPECIAL

9" x 6" SPEAKERS

Brand new, in carton, 4 ohm impedance. Ideal for car cassettes, radios, etc.

\$4.00 each

Postage \$1.00

10 for \$30.00
BULK BUY

MODEL NC-310 DE LUXE

1 WATT 3 CHANNEL

C.B. TRANSCIEVER

- WITH CALL SYSTEM
- EXTERNAL AERIAL CONNECTION

SPECIFICATIONS, NC-310

Transistors: 13.
Channel Number: 3, 27.24 OMHz Ctr. Band.
Transmitter Frequency Tolerance: $\pm 0.005\%$.
RF Input Power: 1 Watt.
Tone Call Frequency: 2000 Hz.
Receiver type: Superheterodyne.
Receiver Sensitivity: 0.7 μ V at 10 dB S/N.
Selectivity: 45 dB at ± 10 kHz.
IF Frequency: 455 kHz.
Audio Output: 500 mW to External Speaker Jack.
Power Supply: 8 UM-3 (penlite battery).
Current Drain: Transmitter: 120-220 mA.
Receiver: 20-130 mA.
Price: \$105.90 pair; \$55.50 ea. Postage \$2.00.



MAIL ORDERS WELCOMED. Please allow pack and post on items listed on this page. If further information required send a stamped SAE for immediate reply from the above address. Larger items can be sent F.O.B. Due to circumstances beyond our control, prices quoted in this advertisement are subject to alteration without notice. New equipment available at our Bridge Road Store.

amateur radio

Published monthly as its official journal by the Wireless Institute of Australia, founded 1919.

MAY 1977

Vol. 45, No. 5

PRICE: 90 CENTS

(See front and post paid to all members)

Registered Office:

2/517 Toorak Road,
Toorak, Victoria, 3142.

Registered at the G.P.O. Melbourne for transmission by Post as a Periodical — Category "B".

EDITOR:

BRUCE BATHOLDS* VK3UV

ASSISTANT EDITOR:

RON COOK* VK3AFW

TECHNICAL EDITORS:

BILL RICE* VK3ABP
GIL SONES* VK3AUJ
KEN PALLISER VK3GJ

CONTRIBUTING EDITORS:

BRIAN AUSTIN VK5CA
ROONEY CHAMPNESS* VK5UG
DAVID DOWNS VK5HP
RON FISHER* VK3OM
DAVID HULL VK3ZDH
ERIC JAMIESON VK3LP
KEN JEWELL VK3ZJ
PETER MILL VK3ZPP
KEVIN PHILLIPS VK3AUJ
LEN FOYNTNER* VK3ZGP

DRAFTING:

ALL DISTRICTS DRAFTING SERVICE
KEN GILLESPIE* VK3GK

PHOTOGRAPHER:

REG GOSDSE —

BUSINESS MANAGER:

PETER DODD VK3CJF

ADVERTISING REPRESENTATIVE:

TOM COOK

***Member of Publications Committee**

Enquiries and material to:

The Editor,
PO Box 2611W, GPO Melb., 3001

Copy is required by the third of each month. Acknowledgment may not be made unless specially requested. All important items should be sent by certified mail.

The Editor reserves the right to edit all material, including Letters to the Editor and Hamade, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:

Advertising material should be sent direct to P.O. Box 150, Toorak, Vic., 3142, by the 25th of the second month preceding publication. Phone: (03) 24 8852.

Hamade should be sent direct to P.O. Box 150, Toorak, Vic., 3142, by the 3rd of the month preceding publication.

Trade Practices Act:

It is impossible for us to ensure that advertisements submitted for publication comply with the Trade Practices Act 1974. Therefore advertisers and advertising agents will appreciate the absolute need for themselves to ensure that the provisions of the Act are complied with strictly.

Printers: EQUITY PRESS PTY. LTD.

50-52 Islington Street, Collingwood, 3066
Tel: 41-9054, 41-5055

QSP THE 1977 FEDERAL CONVENTION

By the time this appears in print the 1977 Federal Convention will be past history.

Whatever comes out of it however is not history. It will be the policy of the Institute as a whole. In exactly the same way that the policy of the Institute derives from all the past Federal Conventions.

The Federal Council, made up of the seven State Councilors with advice and assistance from the Executive, meets each year at what is called the Federal Convention. This is where the guidelines of the Institute originate. There is also provision for postal motions.

The discussions which are carried on in the Federal Convention are centred on current amateur radio affairs. These come forward to the Convention, through the seven Divisions, as Agenda Items. The Chairman of the Federal Convention can permit debate on other matters under what used to be called "general business" items. No advance notice is required for general business items and it stands to reason therefore that debate on these can be stopped if the Federal Council thinks more time is needed for research and general discussion in Divisional councils.

This is how the WIA as a whole makes up its collective mind. Whatever is decided by the Federal Council is going to affect every member in one way or another.

Did you, as a member, help your Division by suggesting anything constructive for discussion at the Federal Convention? If you, as a member, have an interest in any specific matter, do you ask your Divisional Federal Councillor to tell you what is the latest policy or position? Do you, as a member read the report in AR each year about that year's Federal Convention?

Unless you do you could become a mine of misinformation about the WIA.

**D. WARDLAW VK3ADW,
Federal President.**

QSP

THEFT OF EQUIPMENT

From Bathurst Technical College, stolen between 1st and 4th of February, Pye model PF2VH on 458.05 MHz, serials 1231 and 1242, black in vinyl casing. Any information to Box 145, Bathurst, 2795, please.

RECIPROCAL LICENSING PROBLEMS

"One German amateur went in September 1976 for the first time to Yugoslavia with the appropriate reciprocal licence. The licence was received before his departure and allowed mobile operation.

"Customs formalities both in and out of Yugoslavia caused no problems. The serial number of the mobile rig built into the car was entered in his passport and cancelled again when he left.

"Another German amateur who did not have a Yugoslav licence travelled through Switzerland and Austria into Yugoslavia. He had his two metre rig packed in his trunk and duly declared it to the Yugoslav Customs on entry. Several days later his rig was confiscated in his hotel room. Also, his car was temporarily confiscated and he had to pay a fine of the equivalent of DM 150.

"There appears to be little hope of his getting his rig back."
(Thanks to DARC for permission to publish.) (Copied from "Mobile News", January/February 1977.)

AOC and NAOC STUDY PACKAGES

Course materials are available to teachers of Amateur Radio from many sources. The ARRL is producing a great deal of very good Novice course information including teaching notes, student study guides and Morse cassettes.

Roger Davis VK4AAR is producing a complete series of course notes from virtually YR8 level up to AOC. Morse cassettes are also available from this source.

Elizabeth Amateur Radio Club in VK5 has produced a home study guide which lists subjects and appropriate textbook chapters to study.

Your NAOC or AOC multi-choice questions are invited. They'll all be forwarded to the P. & T. Dept. Let's contribute questions of the standard we would like the exams to contain! Thanks to Rex Black VK2YA who has recently forwarded some questions.

VK3ZR.

"INK EMMA INK"

Ex-Australian Special Wireless Group Operators (WW2) — If you would advise Steven Mason at 30 Jacqueline Road Mount Waverley 3149, Vic., of your call signs and frequencies, we might be able to arrange a re-union on the air.

SPACE IDEAS

"Starting in 1979 and following about every half-year thereafter, a space shuttle will take a cylindrical structure to an altitude of 558 km. Experimental packages will remain on board under austere conditions for six to nine months. Then another shuttle will retrieve it, return to earth and NASA will return the packages back to their owners. About 14 ft by 30 ft, the open aluminium cylinder can accommodate more than 70 experiments. The orbital environment, however, provides weightlessness, high vacuum, radiation and particle fluxes." This is a brief description of NASA satellite series LDEF (Long Duration Exposure Facility) appearing in QST January 1977.

WIANEWS

For the record, members will have seen the WIANEWS SPECIAL insert into April AR quoting in full a Central Office letter explaining a number of changes relating to Novice licensing and operations, noting preliminary investigations into the probable grant of a site in Canberra for a national headquarters and a brief reference to an amateur radio brief for WARC 79.

WARC 79

The Executive produced a draft of amateur radio background information which has since been circulated to Divisions. This document sets out to explain the amateur service as fully but as briefly as possible, its value internationally and locally, the great range of activities by amateurs, a very short historical précis, some reference to amateur radio's value in emergencies, the training of newcomers, references to interferences of various kinds, a short appreciation of the amateur satellite service and of course details of the frequency bands now allocated and required in the future.

Unlike the preparations for the last WARC in 1959 the IARU is now much better organised and, recognising that amateur radio is a global activity, has prepared material in a "model brief" form for use by IARU member societies. This document was drawn upon by the APG Committee 2.

A circular produced by the WIA Queensland Division quotes extensively from the Netherlands Amateur Radio Society's journal "Electron" and brings out very clearly the amount of support needed by national societies for WARC 79. Members are supporting amateur radio, including IARU, by being WIA members, but what about the non-members, it asks. One thing is certain. Amateur radio will not lose by default judging by the efforts of the WIA, the IARU and all the IARU member societies. All of this is expensive but essential to the survival of amateur radio to the year 2000 and beyond.

1977 CALL BOOK

The new ten year contract for printing a Call Book was still under

discussion with Central Office during March, but was finally clarified in April.

After discussion the Executive agreed that arrangements for publication should begin.

Given a fair wind there is some hope that the 1977 Call Book should come out by July or August.

1977 CONVENTION ITEMS

Agenda items for the 1977 Federal Convention began to arrive from Divisions a week or two before the deadline of 23rd March.

Here is a brief resume of the items.

From VK2 —

Establish a 10m beacon band plan, review and, if necessary, amend the WIA 70cm band plan, review the 2m FM segment, including more repeater and simplex channels, set up a Novice licensing policy, examine the need for RTTY standards, discuss "CB", publish monthly callsign changes in AR, publish a WIA Year Book, review YRS/YRCS, morse for limited and novice licensees on VHF upwards, review Divisional broadcast timings, review the Federal repeater sub-committee's terms of reference, lower cost amateur licences for longer validity than one year, consider a VHF mileage factor for RD Contests.

From VK3 —

Establish standards for ASCII, ask for a novice segment 29.0 to 29.5 MHz or equivalent on 10m, ask that Novice licensees should be allowed to use VFOs, ask for 51 to 52 MHz or 50 to 52 MHz, morse for limited and Novice licensees on VHF upwards and CW by limited licensees from 420 MHz up.

From VK4 —

Print callsigns or SWL numbers on AR address labels, charge interest on overdue Divisional accounts with Executive.

From VK7 —

Review RD Contest awards and Rule 11.

Too late for Agenda items are some general business items for which advance notice is given. VK2 want an extension to the 576 MHz band and to seek permission for in-band 70cm ATV repeaters. The Executive want to get frequency details of Australian stations licensed to operate in shared amateur bands.

Q&P — continued PUBLIC RELATIONS

"With the vast amount of publicity currently given to CB radio, there's a lot of confusion in the minds of the public as to just what Amateur Radio is. Is it the same as CB? Is a "ham" an amateur or CBER? Stories by confused media writers have only worsened the situation. We need to take our story directly to the public — letting as many people as possible see for themselves what we do, how we do it and how they could do it too. The county fair has been a traditional place to demonstrate Amateur Radio in rural areas. Perhaps the shopping mall is the place to do it in urban areas." Article in Worldradio January 1977.

PORTABLE/MOBILE IDENT.

QST editorial December 1976 queries the latest in the series of FCC deregulations as "deregulation or dilution?". It refers to the fact that from 26th November "FCC-licensed amateurs no longer are required to give advance notice of portable operation, and when operating portable or mobile no longer have to identify as such. Also, when a permanent move is effected, the requirement to use portable identification procedure no longer exists. In other words, the use of the slant bar on CW and indication of portable or mobile operation or phone is no longer required."

INCREASED MEMBERSHIP

The editorial in QST January 1977 reflects upon the relative stagnation of amateur radio growth from about 1964 and reviews the steps taken to reverse this situation. "Then, equally suddenly," the editorial says, "there was another development. Numbers of CBERs began to realize that CB was a certain amount of fun, but that it was limited in its horizons. However, we managed to get the word to many of those CBERs that there was something to replace it, something whose horizons were unlimited, and that something was amateur radio . . . The League spotted these trends early in the game and recognised that much assistance could be provided. This past fall we had some 1,400 club groups giving amateur radio training to about 36,000 would-be Novices."

LARGEST FCC RAID EVER

Under the heading in 73 for January 1977 the Associate Editor reported that Federal Marshalls and FCC agents raided 19 locations in the Baltimore-Washington area early on the morning of October 27th. Confiscated was over 65 thousand dollars worth of equipment used by outlaw SSB CBERs. This, he said, was the largest single FCC raid and capped a lengthy investigation by the Baltimore office in conjunction with the Laurel MD monitoring station.

Amateur equipment made up the bulk of the items — half a dozen linears, Heath and Yaesu transceivers, remote VFO's VHF, HT's, beams and rotors. Incidentally, he wrote, it was not the work of amateur operators that led the FCC to the outlaws, it was pure luck plus massive interference to radio users in the area.

FULL CALL AFTER 20 YEARS FAMINE

A recent letter from Ann Goodall, XYL of John VK3ZBG, advised of John's success recently in obtaining his CW after 20 years with a limited licence.

Congratulations, John, and we look forward to hearing you on the HF bands as soon as your new call is allocated.

It would appear that Ann is also a devoted SWL, and the Goodalls have acquired an FTDX 400 for their insomnia DX.

VK MOBILE ADVENTURE

Brian VK1ZBL/VK1NAK will be operating mobile and portable through all mainland States for the remainder of 1977. The itinerary proposes Northern Australia for the winter months and Perth area around springtime. Bands operated will be 146 F3, 27 A1/A3, and 3.5 A1/A3. Brian will be attempting to maintain a scheduled appearance at 1000 hours GMT Thursdays on 3542 kHz QRP portable. The CW is still a little slow, but should improve rapidly. ■

When the other operator
sends

Q.S.L.

MAKE SURE YOU CAN

HIGH CLASS CARDS. On yellow, light blue, light green or coffee Krome-Kote card. Card shows map of Australia with State boundaries.

YOUR CALLSIGN is in red letters 20 mm high. Main text and map outline in black.

CARD SIZE 145 x 85 mm. Australian Post preferred size.

PRICE PER HUNDRED CARDS

Minimum Order 500

ONLY \$4.00 per hundred

Post and Packing:

N.S.W.	\$2.00
Qld., Vic., S.A.	\$2.50
Tas., W.A., N.T.	\$3.00

Samples only on receipt of stamped addressed envelope.

Will gladly quote on your other
printing requirements.

PRINT call sign, colour, name
and address. Send cash with
order. No C.O.D.

To

G. LINTHORNE VK2GL

20 THOMPSON STREET,
CHARLESTOWN,

N.S.W. 2290

Regrettably prices may increase
without notice due to devaluation.

SCALAR for Antennae

Amongst the comprehensive range of
SCALAR ANTENNAE there are some
of special interest to the Radio Amateur.

These include our VHF and UHF, C.B.
Range, HF Mobile and Base Station
Units for Land and Marine applications,
for example . . .

Model M25

For more efficient 2-metre performance
use the SCALAR M25. A 3 dB gain
mobile, designed for use in the 140-175
MHz band. The antenna is a 5/8 wave-
length whip complete with integral load-
ing coil. Constructed of fibreglass,
these antennae combine resilience with
non-ferrous continuity for high quality
performance and noise free operation.

and SCALAR'S OWN . . .
"MAGNABASE" Model MBG



This high quality magnetic base may be
fitted with any SCALAR whip. Instant
installation on any flat metal surface.
Fully protected for scratch-free mounting.
Complete with 12 feet of RG58CU coaxial
cable.



SCALAR
Industries Pty Ltd
Communication Antennae Engineers

Available from:

N.S.W.:	Dick Smith Electronics	Phone: 439-5311
VIC:	Bail Electronic Services	Phone: 89-2213
S.A.:	Rogers Electronics	Phone: 284-3296
W.A.:	Allcom Pty. Ltd.	Phone: 57-1555
QLD:	Electronic Components	Phone: 371-5677

Trade Enquiries: NSW: 570-1392

VIC: 725-9677

IMPROVING POWER OUTPUT OF THE IC-22

Phil Wait VK2ZZQ
and Roger Harrison VK2ZTB

Perhaps the most popular two metre FM transceiver in Australia at present is the ICOM IC-22, one of the products of the burgeoning Japanese amateur communications manufacturing industry. Undoubtedly it enjoys this popularity owing to its price firstly, and secondly to its features. By reputation, if not largely in fact, it has perhaps the "hottest" receiver of similar transceivers intended for 2m FM mobile operation.

The RF power output of these transceivers is nominally 10W. Most units will probably produce close to this when first purchased. However, it appears from experience, that the RF power output deteriorates with use, some dropping below 6W. The reason for this is not fully understood, but suffice to say that the phenomena exists and is certainly measurable.

Now, this situation is not all that disastrous in itself as it is only in the order of 2-3 dB, but it isn't entirely welcome either as the IC-22 is intended as a mobile transceiver where every dB counts. The capture ratio of most modern FM receivers on the amateur market is around 2 dB.

Another problem arises when a 'boost amplifier' (often incorrectly referred to as a 'linear') is added, such as those kits that have become recently available as well as commercially made units. These devices produce about 35-45 W output from a nominal 10 W drive and are simply inserted in the coax between the antenna and the transceiver antenna socket.

SWITCHING

Automatic Tx/Rx switching using either diodes or carrier-sensed relays is employed. If the drive is not up to the nominally required amount, considerably less than specified power output is obtained and the full gain of the device is often not realised. Gnashing of teeth, cursing the kit designers, tearing of hair and cries of "why doesn't anything work for me!!"

In the course of some development work on solid-state VHF power amplifiers, the IC-22 belonging to Phil VK2ZZQ was pressed into service as a driving source. Over a period of months the power output dropped from around 9 W or so to under 6 W when the unit was running from a

nominal 13V supply. A number of enquiries and measurements confirmed the effect, many units delivering only 6 W to 7 W. Accordingly, a replacement for the P.A. transistor was sought out.

The transistor settled on was the CTC B12-12. The gain of this device appeared to be more than adequate for the job and a power output of between 11 W and 15 W from a nominal 12.5V supply was expected. In addition, the device is rated to withstand infinite VSWR, at all phase angles, from a 16V supply.

However, the input and output impedances of the existing P.A. transistor in the IC-22 were not known. A little bit of the old amateur 'suck it and see' (otherwise known as eclectic empiricism — see reference 1) was obviously going to be necessary.

Some modification of the L-G matching networks was anticipated.

Accordingly, a B12-12 was installed in place of the original P.A. transistor. With due ceremony the power output was checked to ascertain what tuning up might be necessary. Power output measured at just on 12 W from a nominal 13V supply (reference 2). Adjustment of the stage input and output trimmer capacitors could not improve on this! Bandwidth is excellent, there being less than 0.5 W variation between 146 MHz and 147 MHz.



FIG. 1. THE B12-12 RF POWER TRANSISTOR

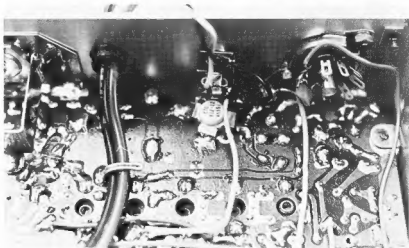


FIG. 4. THE B12-12 INSTALLED. THE COLLECTOR LEAD IS TO THE RIGHT, ADJACENT TO THE 'CTC' MARK



FIG. 2. CAREFULLY CHAMFER THE LEADS OF THE B12-12 IN THIS FASHION

Now for the actual conversion details. It is simplicity itself. Only the following explanation is complicated. You will need the following artisan's aids:—

- (a) One pair of household scissors.
- (b) One Phillips-head screwdriver.
- (c) One pair of long nose pliers.
- (d) One 20 W (min.) soldering iron.
- (e) 115 mm of knot-free 50/40 solder with genuine resin core.
- (f) One solder sucker.
- (g) One hand drill (of 2.6 v 10' erg capacity at rest)

OR

- one steam-driven electric drill with toothbrush, pencil and razor sharpener attachment.
- (h) One 3/16" diameter drill bit (sharp as a tack).
- (i) Thirty two minutes and 47 seconds of real time (as opposed to Greenwich mean time which is scotch anyway).
- (j) One hammer (to discourage distractions).
- (k) One centre punch (to rivet your attention).

Firstly, the original P.A. transistor is removed. It is located on the under side (copper side) of the printed circuit board, towards the centre-back, immediately beneath the external speaker socket. Unbolt this socket and move it out of the way to afford easier access to the P.A. transistor.

Carefully desolder each lead of the P.A. transistor. The solder sucker ensures a neat, clean job and minimises the possibility of damage to the p.c. board. The transistor is bolted onto a flange that is attached to a flat aluminium heatsink bolted to the backdrop of the chassis/cabinet. Unbolt the transistor and carefully remove it. Don't discard it as it may be needed in the event of a catastrophe (like when junior decides that the B12-12 is a monster from Dr Who and promptly flushes it down the toilet).

Using the clearance hole in the p.c. board as a guide, put a punch mark (gently Bentley!) on the flange so that it is positioned centrally with respect to the hole. Drill a 3/16" diameter hole in this position, carefully deburring it. This is to take the bolt of the B12-12. Smear the flange with silicone grease to ensure good thermal contact between the transistor and the flange.

Now, carefully chamfer each lead of the B12-12 with a pair of sharp scissors or small tin snips. Scissors are best. See figure 2. Insert the B12-12 into position and judge how the leads need to be bent in order to make connection with the appropriate lands on the p.c. board. The collector lead is adjacent to the CTC mark on the header and this is oriented towards the antenna socket. The leads may need to be shortened somewhat, depending on their original length. Bend them approximately as shown in figure 3. Take care not to stress the leads or the lead-to-ceramic-header junction. Insert the B12-12 into position again and check that the leads match up with the lands on the p.c. board without shorting to the adjacent ground plane. Resist the temptation to solder it in place.

If all is well, bolt the transistor in place, taking care that no vertical stress is placed on the leads and that they remain in correct alignment. Now you can solder the leads to the p.c. board. Replace the external speaker socket last of all. A view of the completed conversion from the under-side of the chassis is shown in figure 4.

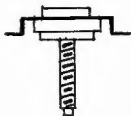


FIG. 3. BEND THE LEADS APPROXIMATELY LIKE THIS (ONLY TWO LEADS SHOWN FOR CLARITY)

Connect the antenna socket to a 50 ohm dummy load to test the converted unit. A reliable means of measuring the power output should be used. Briefly hold the transmit button down and note the power output. Some tuning may be necessary. Do not hold the transmitter on for long periods until maximum power output is achieved.

The RF output indication will now cause the meter to go full scale. This is easily adjusted. There is a diode that picks up some RF from a coil in the output network located in the shielded compartment adjacent to the antenna socket. Its location is indicated in figure 5. The diode is mounted with 1/2" leads. Simply bend it towards the back panel until the meter comes back on scale again when transmitting.

And that's about it. Double your deteriorated output power and drive your booster amp., neighbours, local repeater, etc. to distraction! The heatsink in the IC-22 gets hotter than it did previously, but the temperature rise is within the limitations of the transistor. Keep your covers short in any case — give the lower power stations a go!

REFERENCES

- (1) Chambers 20th Century Dictionary, pages 334 and 346.
- (2) Bird 'Thru-line' wattmeter with 50 W, 50-250 MHz module and Delco 50 ohm dummy load.

Photos by Phil Wait WK2ZQZ

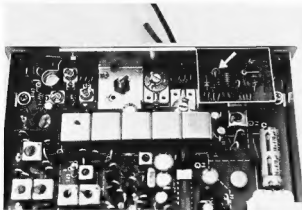


FIG. 5. TOP VIEW OF IC-22 SHOWING THE B12-12 FIXING NUT AND THE RF OUTPUT PICKUP DIODE

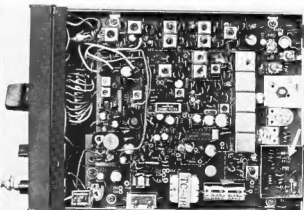


FIG. 6. TOP VIEW OF CONVERTED IC-22. LOCATION OF THE RF OUTPUT DIODE IS INDICATED BY THE ARROW



Mini-Mobile/Base Station

FT-75B High power, for General use. FT-75BS Low power, for Novice use



TECHNICAL DATA — FT-75B

GENERAL

Frequency Range: 80 M 75 KHz segment, 40 M 100 KHz segment, 20 M 150 KHz segment, 15 M 240 KHz segment and 10 M 400 KHz segment.

Mode: Upper Sideband for 20, 15 and 10 meter bands. Lower Sideband for 80 and 40 meter bands. CW for all bands.

Frequency Control: Crystal control VXO with 3 channels per band.

VXO Coverage: ± 3 KHz for 80 M, ± 3 KHz for 40 M, ± 5 KHz for 20 M, ± 5 KHz for 15 M and ± 8 KHz for 10 M.

Antenna Impedance: 50 Ohm unbalanced.

Size: 210(W) x 80(H) x 300(D) mm.

Weight: 3.5 Kg.

RECEIVER

Sensitivity: 0.5 μ V for 10 dB Noise plus Signal to Noise Ratio on 14 MHz for SSB and CW.

Selectivity: 2.5 KHz nominal bandwidth at 6 dB down, 4.5 KHz at 60 dB down on SSB and CW.

Harmonic & Other Spurious Response: Image Rejection better than 50 dB. Internal Spurious Signal below 1 μ V equivalent to antenna input.

Automatic Gain Control: AGC threshold nominal 1 μ V. Attack time 5 millisecond and release time 1.5 seconds.

Audio Output: 2 Watts at 4 Ohm Impedance.

FT-75B, inc. one crystal for each band 3565, 7085, 14,200, 21175, 27125 kHz, mic. & inst. book \$357

FT-75BS, inc. crystals for 3565, 21175, 27125 kHz, mic. inst. book \$346

TRANSMITTER

Input Power: 120 Watts PEP on SSB and 100 Watts on CW at 50% duty cycle. (Slightly lower on 10 meter.)

Microphone: 50 K Ohm dynamic type.

Carrier Suppression: -40 dB.

Sideband Suppression: -40 dB.

Spurious Radiation: -40 dB.

Distortion: -30 dB.

Final Tube: 12G87 x 2.

JAS7576-22

All prices include S.T., Freight extra. Prices and specifications subject to change.

90 DAY WARRANTY



ELECTRONIC SERVICES

60 Shannon St., Box Hill North, Vic., 3129. Phone 89 2213

Distributors in Old. & NSW, S.A., W.A.

**FRED BAIL VK3YS
JIM BAIL VK3ABA**

TO COMPLEMENT OUR USUAL RANGE OF CRYSTALS

BRIGHT STAR CRYSTALS PTY. LTD.

35 EILEEN ROAD, CLAYTON, VIC., 3168. Phone: 546-5076 (Area Code 03)

CAN SUPPLY A RANGE OF —



- OSCILLATORS
- WIDE-BAND AMPLIFIERS
- TTL & CMOS DECADE COUNTERS
- ELECTRONIC CRYSTAL OVENS

INTERSTATE AGENTS:

Adelaide: ROGERS ELECTRONICS — Phone 42 6666

Brisbane: FRED HOE & SONS PTY. LTD. — Phone 47 4311

Perth: COMMUNICATION SYSTEMS — Phone 76 2566

Hobart: DILMOND INSTRUMENTS — Phone 47 9077

ANTENNA PARTS. KITS



QUAD HUB \$35.00 plus Postage
(3 kg) mass.

QUAD KIT \$135.00. Freight forward

Consisting of Hub 12 ft solid F/G. Spreaders Aluminum Extenders Ferrules Adaptors. 350 ft 0.064 Hard Drawn Copper wire. Nylon line and insulators.

MOBILE ANTENNA PARTS:

6 ft. solid F/G blanks. \$4.50 ea.

1/2-1/2 inch Solid brass butt fitting, 1/2 in.

whit. or 3/8 in. UNF thread \$3.00

Brass lip chuck 50c

S. T. CLARK

P.O. BOX 45, ROSANNA

VIC., 3084 Ph.: 45-3002

A SHORTENED FORTY METRE DIPOLE

J. R. Trevena VK3AZX
101 Wanda St., Mulgrave, 3170

This is not a new idea, but one which may be of interest because of its size and light weight. It can be used with a single mounting and also can be rotated, as it is at this QTH.

The idea of making this dipole came after the successful use of centre loaded whips for 3.5, 7.0, and 14.0 MHz whilst operating portable during caravan holidays over the past 5 or 6 years. The dipole is constructed using two of these whips mounted horizontally opposing each other and fed with coaxial cable through a 4:1 balun. The SWR is 1.2:1 or better over approximately 15 kHz.

The coils are the heart of any loaded antenna system and must have very low loss, but mechanical stability is also a factor. Several ideas were tried and this one has proved quite satisfactory.

The material is readily available from plumbers and aluminium suppliers.

The results have been compared with an inverted "V", an inverted G5RV and a loaded whip, and in all cases of VK4, VK6, P29 and ZL contacts, the loaded dipole was as good as or better than the others. One factor was noise, the three comparison antennas being 1 to 3 "S" points greater in noise level than the horizontal loaded dipole.

The total length of the dipole is 22 ft. 4 in. This may vary quite considerably if larger or smaller diameter tubing is used. The outer section is constructed so as to give a variation of 18 inches in length i.e. 3 ft. overall, which should cover all conditions of adjustment.

CONSTRUCTION DETAILS

LOADING COILS

Cut a 4½ in. length of 1½ in. PVC tube and cut out as shown in Fig 1 to serve as a skeleton coil former. Fig 2 shows the

general arrangement of the antenna assembly.

Cut a length of 2½ in. PVC tube 5½ in. long for the coil casing and fit a disc each end made from a piece of ¾ in. thick bakelite or fibre glass sheet. Remove these discs until later.

Cut a piece of 2 x 1½ in. aluminium channel 1½ in. long and drill and file a hole in each of the parallel sides to fit neatly over the 1 in. aluminium tube. Fit a U-bolt to hold the tube to the bracket, and fit this bracket to the fibre glass discs with 4 nuts and bolts (nuts outside). Drill and tap bracket to take solder lug for coil termination, duplicate this bracket for the ½ in. tube at the other end of coil and fit one end disc to the coil casing, securing it with PVC cement and 4 screws tapped in radially.

Next close wind 15 ft. of wire for the coil on the 1½ in. diameter tube, release tension and slip it off tube. Drill two holes 1/16 in. diameter each end of coil former for termination of winding, ease the winding on to the former and terminate one end leaving one inch of wire protruding. Stretch winding carefully to cover coil former from end to end of open section and terminate remaining end, once again leaving one inch protruding. The wire should be fairly tight on the former. Now space the winding with a piece of thin cord evenly over the whole of the former, fix wire with PVC cement and leave to set. Match-sticks can be used to keep turns evenly spaced whilst cement is setting.

Drill holes in the discs to take the coil ends, slide the coil inside the casing and fit remaining end disc with cement and screws as before. Solder a lug to each end of coil. A check with a GDO should show self-resonance at approximately 45 MHz. Duplicate for other coil and seal all holes with PVC cement.

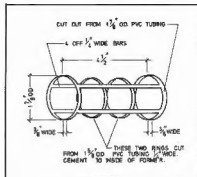


FIG. 1

ELEMENT CONSTRUCTION

The telescopic section is next to be constructed.

If the ½ in., ¾ in. and 1¼ in. sections do not fit snugly into their mating sections, expend one end of each a little with a tapered tool to give a fairly tight sliding fit.

The lengths required for each section are (in inches):

Diameter	Length
1	35
¾	36
½	24
¾	21
¼	30

Overlap the 24 in. and 21 in. sections 3 in. into their mates and fit 3 self-tapping screws around tube at each end of overlap. Leave the ¼ in. outside section free until final adjustment, then fix likewise. Attach 1 in. and ½ in. sections to the coil and tighten U-bolts. Duplicate for other sections of dipole.

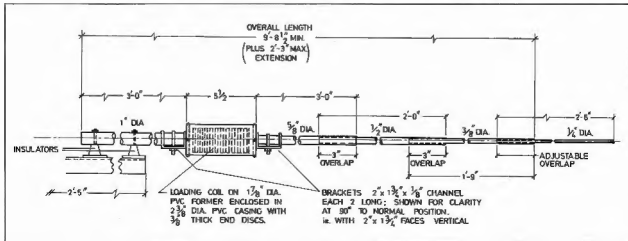


FIG. 2: Arrangement of each Half of Loaded 7 MHz Dipole.

TESTING

We now have two $\frac{1}{4}$ wave whips, so we can check each independently. If you have a metal roof, fix an insulator to hold one of the $\frac{1}{4}$ wave sections as a vertical and check resonance with a GDO. Adjust to about 7050 kHz, feed antenna with 50 ohm coaxial cable, check SWR and adjust for best SWR. Do the same for the other $\frac{1}{4}$ wave section at the same frequency. You will probably find a slight difference in the length of the two sections. Maintain this difference in the final configuration.

Next, mount the two half dipoles to the four stand-off insulators and attach to the remaining section of aluminium channel.

Mount the balun and connect the 4:1 ratio and reverse of normal, that is with the coaxial cable to the antenna terminals and the antenna to the coaxial terminals. This is because the antenna feed point impedance is in the order of 10-12 ohms.

Mount the antenna about five feet or so above the roof or part way up the mast and check resonance and SWR. Adjust for best SWR at 15-20 kHz higher than the frequency required, because the resonant frequency will drop slightly as the antenna is raised to the full height above ground.

Finally, fasten the $\frac{1}{4}$ in. sections of tube with self-tapping screws. Cover all telescopic joints with Araldite, tighten all screws and U-bolts and cover the screws and nuts also with Araldite.

Footnote: Suitable baluns are described in the ARRL Radio Amateur's Handbook 1971, page 350, or Electronics Australia, October 1965.

MATERIAL REQUIREMENTS

Aluminium Tubing: 1 in. OD 18 SWG 6 ft.; $\frac{1}{2}$ in. OD 18 SWG 6 ft.; $\frac{1}{2}$ in. OD 18 SWG 4 ft.; $\frac{1}{2}$ in. OD 18 SWG 3 ft. 6 in.; $\frac{1}{2}$ in. OD 18 SWG 5 ft.

Aluminium channel 2 in. x 1 $\frac{1}{2}$ in. x $\frac{1}{2}$ in. thick 3 ft.

White PVC Tubing 2 $\frac{1}{2}$ in. OD $\frac{1}{2}$ in. thick 1 ft.; 1 $\frac{1}{2}$ in. OD $\frac{1}{2}$ in. thick 0 ft. 6 in.

Insulators Stand-off 1 in. 4 off.

Bolts "U" 1 in. x 1 $\frac{1}{2}$ in. long cad plated 2 off; $\frac{1}{2}$ in. x 1 $\frac{1}{2}$ in. long cad plated 2 off.

Fibre glass sheet 4 $\frac{1}{2}$ in. square x $\frac{3}{8}$ in. thick.

Enamelled wire 16 SWG 30 feet (15 ft. each coil).

Bolts, nuts, fibre washers, PVC cement and Araldite.

TRY THIS

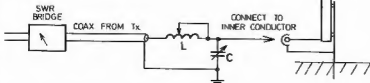
With the Technical Editors

Terry Stewart VK4AAT

Being the owner of a 14AVQ which covers 40-10 metres, and desiring to work on 80 and 160 metres with my FT101, I dug into the junk box and came up with a rotary inductor and a large transmitting variable capacitor.

These were connected, as shown in the diagram, between the coax and the 14AVQ and a good signal was possible on 80 metres and a reasonable SWR was obtained on 160 metres. Whilst good results were obtained on 80 metres, I feel the antenna is very short and inefficient on 160 metres.

The antenna is mounted 6 inches above the ground on a stake without radials. Efficiency could be improved with radials.



AMATEUR COMMUNICATIONS ADVANCEMENTS

P.O. BOX 57
ROZELLE 2039

NEW! A Complete Range of Solid State VHF Power Amplifier Kits for FM or SSB Service, powers from 3W to 40W. Pre-Evaluation Prices!

Our PA kits use the top of the line CTC series of 120V VHF RF power transistors which are rated to withstand infinite VSWR at all phase angles at rated power output from a 10V supply.

PA3-12

If you have/will/are built/building your own 2m transmitter or transfer then this kit is just right for you. Specified to give 3W output from 300 mW drive. It generally requires only about 100 mW. Suitable for FM or SSB. Constructed on our 'standard' RF PA board (PA-3) which measures only 50 mm x 75 mm! Efficiency around 82% (class C), draws approx. 400 mA at 12.8V; bandwidth 7 MHz. Uses CTC BS-12 transistor.

Basic Kit only, includes transistor, board, components — \$16 plus \$2 cert. post & pack.

PA12-12

This Kit is intended as a booster amp. for 2m SSB/FM low power or hand-held transceivers. Diode Tx/Rx switching included. Typically gives 15W to 15W output from 1.5W to 2.5W drive, efficiency better than 85% (class A), 1.4A at 12.8V and has a bandwidth of about 7 MHz. Also constructed on our 50 x 75 mm PA board (PA-3). Uses CTC B12-12 transistor. Just the thing for your Ken, Standard or IC200!

Basic Kit, includes transistor, board, components — \$21 plus \$2 cert. post & pack.

Complete Kit, Basic Kit plus heatsink and metal box, BNC coax connectors, etc. — \$27 plus \$2 cert. post & pack.

PA40-12

This Kit features Stripline Construction and is intended as a booster amp. for 10W 2m SSB/FM Transceivers; it includes Diode Switching for Tx/Rx — replaces our ETI-710 kit. This new design provides more consistent results, simpler construction and alignment and presents a low SWR to the driving source. Constructed on a double-sided fibreglass PC board, Delivers 40W-50W output (class C) from 6W-12W drive, efficiency greater than 80%, draws 5.5A at 12.6V, excellent linearity on SSB. Minimum gain 5.5 dB. Uses B40-12 transistor.

Basic Kit, includes transistor, board, components — \$38.50 plus \$2 cert. post & pack.

Complete Kit, Basic Kit plus heatsink and metal box, BNC coax connectors, etc. — \$47.50 plus \$2 cert. post & pack.

RF POWER DEVICES

For those who wish to go it alone... (transistors supplied with data).

B3-12	\$6.50
B12-12	\$6.50
B40-12	\$18.50
The Set	\$32.00
MRP803, class B or C amp, 10W out, 10 dB gain, up to 300 MHz — SPECIAL —		\$6.50
MA4006, 40W power varactor for triplers to 432 or 1296 MHz — SPECIAL —		\$10.00

Add \$1 cert. post and pack to above prices.

VHF/UHF CONVERTERS

We stock converters for 28 and 52 MHz (ETI-707B) at \$13, 144 MHz (ETI-707A) at \$17, 432 MHz at \$17. Add \$2 cert. pack and post.

RADIO TELETYPE

Jostein Gjerd, LA7MC

PART 5 AN RTTY CONVERTER WITH ACTIVE FILTERS

This month's article has been adapted from an original article by DJ6HP by LA7MC. This article was of such length that it has been necessary to split it into two portions. The active filter is an alternative to the LC filters for which appropriate inductors are often hard to locate. The DJ6HP system must be the RTTY converter to beat all RTTY converters. Read on and find out why.

Most RTTY amateurs use their SSB station for transmission and reception. The signal they use for the printer is taken from the receiver's low-frequency output. The low frequency converter which is coupled after controls the receiver magnet in the teleprinter. On the other hand the AFSK signal is carried to the transmitter microphone input and radiates as an ordinary SSB signal.

The RTTY converter described here has, compared against the previously described constructions (including ST5 and ST6), the following advantages:—

- continuous shift adjustment by means of a potentiometer,
- by using active filters you can do away with the inductances which till now have been used for this,
- the Q quality for the active selection circuits is proportional to the frequency, thus the bandwidth in Hertz remains constant,
- the active filters operate by simple means so that the converter becomes flexible and can be adjusted to different operating requirements,
- setting up is very non-critical and adjustment takes less than 5 minutes.

The RTTY converters work almost always on the same principle. The low frequency signal from the receiver is passed on to the limiter V1 (Fig. 1) which is no more than a stage with a very high voltage amplification. Also, many small low-frequency voltages pass through the amplifier completely, so that at the output of V1 the whole low frequency spectrum from the receiver is present at the same amplitude. The voltage peaks are cut off, as the amplifier is always supplied with sufficient input to give positive and negative limiting (saturation and cut off)

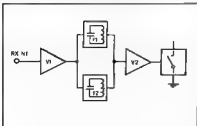


FIG. 1. Basic TU Schematic

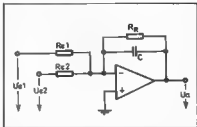


FIG. 2. Basic Active Filter

The limiter serves also to bring all low frequency signals from the receiver up to a constant amplitude value. The amplification factor of V1 fulfills this necessary function.

It is often maintained that the limiter suppresses the AM components. This happens unfortunately only in HF and medium frequency limiter stages where the amplitude, which varies mutually with the modulation, is cut off. Low frequency limiters thus amplify useful signals and noise signals.

After the limiter follows the choice of the two low frequency tones F1 and F2 which correspond to mark and space. These tones are for 850 Hz shift for example 1050 and 1900 Hz or 2125 and 2975 Hz. For 170 Hz shift one can use for example 1050 and 1220 Hz or 2125 and 2295 Hz.

In the two selection circuits the two low frequency tones for mark and space are filtered out of the frequency band containing signals with similar amplitude as a result of the limiter's action. When the maximum speed from RTTY is no higher than 50 baud, there is a 3 dB bandwidth of 50 Hz. Besides the selectivity effect, this also brings a low pass filter effect where higher keying frequencies are damped by the narrow band selectivity in the filter.

If you rectify the amplified and filtered low frequency signal for the frequencies F1 and F2 you will not get a square pulse as the frequency relationship is limited by the 3 dB bandwidth at 60 Hz. (This is due to the rise time of the narrow filter, that is the time taken for a signal to build up to a steady value, being significant compared to 22 mS.—Ed.)

For this reason there follows a type of filter which produces square pulses from the input signal. These square signals are used to operate a keying transistor which then keys the receiver magnet in the teleprinter.

DESIGN OF THE CONVERTER

With limiter amplifiers today it is usual to use an operational amplifier with high amplification. Amplification can be about 90-100 dB, that is 100,000 times. For this purpose type 709 IC amplifiers will be useful and this type is produced by most firms who make integrated circuits.

If you go from an average amplification of 50,000, 0.5 mV at the input will be sufficient to operate the operational amplifier to the positive and negative print levels, if you assume a supply voltage of $\pm 15V$. In this way you have with type 709 an ideal limiting amplifier as with its effective clipping all signals from the receiver's low frequency output will be brought to the same level.

In published literature on the subject it is always recommended to have a band pass filter before the limiter. This filter is so made that the two tones for mark and space lie within the limit frequencies of the filter. This filter is most often constructed of LC and gives 40 dB suppression to the undesired signals provided that the filter is produced in good amateur fashion.

The task of the filter is to damp the spurious signals with higher amplitude than the useful signal, such that they become weaker than the useful signal. If the amplitude of the spurious signals is greater at the input of the limiter, the useful signal will appear as a voltage superimposed on the noise signal and will be cut off by the limiter. If such a noise signal falls within the pass band of the coupled filter, printing errors cannot be avoided. The best result occurs when the input filter only lets the useful signals pass. But if the noise signal falls within the frequency of one of the two channels, typing errors can only be prevented by a logic circuit, provided the other channel is noise free. For amateur use such a logic circuit could be too expensive.

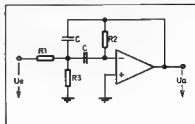


FIG. 3. Active Tuned Circuit



EMONA electronics

CBC BANK BLDG., HAYMARKET PHONE: 399 9061
Room 268/661 GEORGE ST., SYDNEY, NSW 212 4815

MAIL ORDERS: Box K21, Haymarket
NSW, 2000, Australia

WRITE, PHONE OR CALL IN!

INTRODUCING NEW LINEAR AMPLIFIER!

for use with



HF-10-100L AMPLIFIER

Frequency Range	3-30 MHz
Input Power	10W Nom. 5-20W PEP range
Output Power	100W Nom., $\pm 1/2$ dB across band, 200-250W PEP output
Input Impedance	50 ohm nom., adjustable to match exciter range under 2:1 across band
Output Impedance	50 ohm nom., up to 3:1 VSWR acceptable with little degradation
Current Drain	15 A nom., 20 A supply recommended at 13.6V DC
Power Supply	13.6V DC recommended for best results, 11-14V DC acceptable positive or negative ground
Pre-amp	18 dB nom. gain across entire HF band, 15 dB typ. at 50 MHz, 3-4 dB NF
Size	19 1/2 x 16 5/8 x 8.9 cm Weight 1 1/2 kg



YAESU FT 301 Series
160-10M, 10W, 55B

WRITE FOR SPECS!

CHECK OUR STOCK ON:

- YAESU FRQ-7 GENERAL COVERAGE RECEIVER (Wadley Loop)
- YAESU FT101E ● KENWOOD TS520, TS820 etc
- ALL AMATEUR RADIO EQUIPMENT AVAILABLE ON 10% DEPOSIT TO APPROVED BUYERS!

HAM WORLD

TIME CLOCK — BATTERY
OPERATED — \$28

(P & P Int \$3.50, NSW \$2.50)



ATTRACTIVE ROOM MATE

CR-102 ALL
ELECTRONIC 12/24
HOUR DIG. CLOCK
AM/FM RADIO,
Sliding Brightness,
Volume and Tone
Controls
EXCELLENT VALUE!



\$49.95

(P & P Int \$4.00
NSW \$2.50)

ALSO AVAILABLE:

- EMONA E-2, 24 Hour AM/FM Dig. Clock Radio.
- EMONA E-4, 24 Hour AM/FM Stereo Dig. Clock Radio
- EMONA DHM-95 (9 Trans.) AM/FM Pocket Radio
- ELCON Range of Scientific (SC-8010 & SC-44F) and Business Calculators
- LAMBDA, Six Function, LED-Quartz Dig. Watch.
- Car Radios, Car Cassette Players, etc.



• LUBRICANTS • PENETRANTS • RUST INHIBITORS • COLD GALVANIZE
• ELECTRONIC & HEAVY DUTY CLEANERS • ULTRASONICS

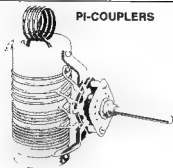


zephyr

products

FOR ALL YOUR INDUSTRIAL REQUIREMENTS
CONTACT US TODAY
ABLE DEVELOPMENT TELEPHONE 005 569 2912





PI-COUPLERS

WILLIS MEDIUM POWER TYPE

For use up to 600 watts p.e.p. Match plate loads of 2,000 to 3,500 ohms (Z) and higher into co-axial cables. Operating Q increases on higher frequencies to increase harmonic suppression, enabling practical values of tuning capacity to be used on 10 and 15 metres and allowing for wiring inductance (L). Incorporating extra switch section for shunting additional capacity (C) if required, or switching other circuits. Switch rated for 10 amps at 200V volts with contact resistance (R) of 0.01 ohms.

Suggested for use in "A LINEAR POWER AMPLIFIER FOR AUSTRALIAN CONDITIONS" (Refer "Amateur Radio", April, May & June issues, 1976).

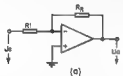
PRICE: \$23.95

William Willis & Co.

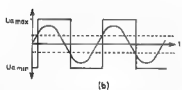
PTY. LTD

Manufacturers and Importers

77 CANTERBURY RD., CANTERBURY
VIC., 3126 Phone 836-0707



(a)



(b)

FIG. 4 — (a) Simple inverting Schmitt Trigger

(b) Schmitt Trigger Waveform

The necessary selection circuit in the "heart" of the converter for filtering mark and space frequencies is always more easily built with LC resonant circuits. Every RTTY amateur who has built a converter or tried to improve a commercial type has found that the inductance is some unpleasant, unknown size. On one hand, the winding of the coil can be a tiresome process, on the other hand you have almost no control of the Q value such that you are required to test it out.

If you wish in addition to be able to receive different shifts, the work and cost

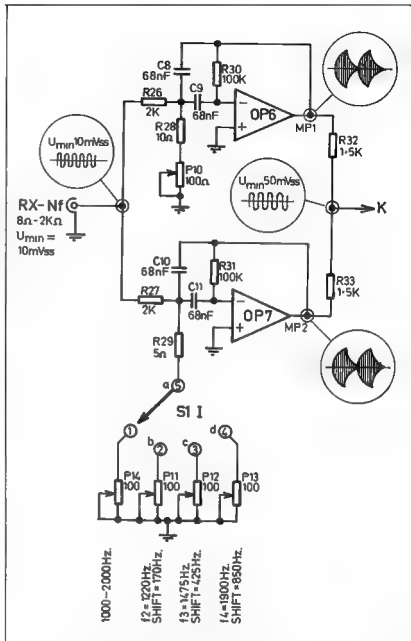


FIG. 5. Tuneable Mark-Space Filter

of the coils increases proportionately, if you wish to avoid the bandwidth attenuation attained by parallel coupling of different capacitors in the wiring circuits. No one previously thought of using continuous shift variation, since to vary capacitors in the order of 0.1 uF and coils in the order of 100 mH was difficult to achieve.

With modern electronics it is possible to avoid these difficulties, through the use of operational amplifiers increasing the resonance characteristics of the RC

circuit, such that you can attain characteristics similar to an LC circuit. Fig. 2 shows a low pass filter whose output is the sum of two input signals. Fig. 3 shows how you can connect an operational am-

TELETYPES, Repairs, Changeover Mechanisms, Spares, Paper Rolls and Tape, MACHINES FOR SALE
Network Engineering, 492 Jones St., Urmila, N.S.W. 2007. Phone (02) 211-4630.

plifier so that it functions as a parallel resonant would. The mathematical background you can find in a handbook and you will be surprised at how exactly you can determine the Q value, amplification and resonant frequency beforehand.

Resonant frequency . . .

$$f_0 = \frac{1}{2\pi \sqrt{C} \times \left(\frac{1}{R_1} + \frac{1}{R_2} \right)} \quad (1)$$

Voltage gain at f_0 ,

$$V_f = \frac{R_2}{2R_1} \quad (2)$$

Circuit Q . . .

$$Q = f / (\text{Bandwidth}) \quad (3)$$

$$= \frac{1}{2} R_2 \times \frac{1}{R_1} + \frac{1}{R_2} \quad (4)$$

$$= R_2 \times C \times f_0 \times \pi \quad (5)$$

The formulae indicate to experienced readers that the resonant circuit in Fig. 3 is almost ideal for RTTY and CW purposes.

If you consider the active filter for the frequency range 500 Hz to 2.5 kHz and find realistic values for the passive building elements through repeated calculations you will not choose R_2 greater than 500k ohm, assuming you are using an operational amplifier type 709. The Q value (for 50 Hz bandwidth) in the range 100 to 200 Hz is between 20 and 40. The capacitors will then have values between 20 and 100 nF. If you have enough input voltage from the limiter (about 25 volts peak to peak) you can set the amplification to 1 or even less such that R_1 is of the same order of magnitude as R_2 . For the chosen frequency range and the Q value as desired R_3 will adopt a value between 10 and 70 ohms.

You can simplify the formula for resonant frequency as the factor . . .

$$\left(\frac{1}{R_1} + \frac{1}{R_3} \right)$$

is mainly decided by R_3 as R_1 is much greater than R_3 .

Equation 1 becomes . . .

$$f_0 = \frac{1}{2\pi C} \sqrt{\frac{1}{R_2} + \frac{1}{R_3}} \quad (6)$$

This means that you can vary the resonant frequency of the filter continuously by varying R_3 . The output voltage amplitude thus remains constant because R_3 does not appear in the formula for amplification. On the other hand, the Q value has a linear increase with increasing resonant frequency, (f_0), such that the bandwidth remains constant during frequency alteration. This corresponds with our requirements for the circuit.

The signal out from the selection circuit in Fig. 6 is rectified, on one side the positive halfwave and on the other side the negative halfwave is cut out, but more about this in the next issue.

(To be continued)

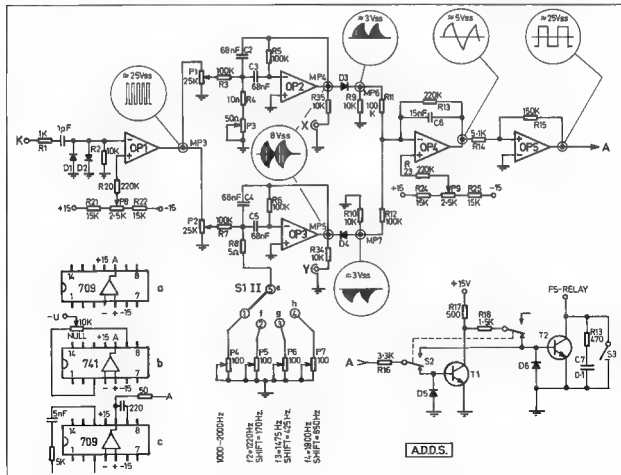


FIG. 6. TU Circuit

THE MT. GININI REPEATER

Martin Hood VK1ZME
12 Womba Pl., Gira ong, 2517

On Saturday, 12th February, an enthusiastic team of workers scaled the tortuous road from Canberra to Mt. Ginini to install the long awaited Channel 7 repeater. There was no shortage of willing hands as VK1WI portable was also occupying the Mt. Ginini site for the John Moyle Memorial Field Day. As well as a good collection of VK1's, Chris VK2ZDD, Jamie VK2YCJ, Arthur and Dave VK2BDT ventured from VK2 to assist.

The installation was the culmination of two years of hard work by Peter VK1DS, who has mothered the project since the completion of the Mt. Majura Channel 8 repeater at Easter in 1975.

That the repeater was installed in its final location and was operating within one day is testimony to the careful design and rigorous testing undertaken before the installation proceeded. Mt. Ginini is a most unpleasant one and a half hours drive from Canberra and under snow for four months of the year, thus the reliability required of the repeater needed to be of the highest order. Mt. Ginini is also an excellent VHF location and while not the highest peak in the vicinity, is the tallest with road access and readily available power.

The repeater has proved itself to be extremely powerful and has considerably broadened the range of stations contactable on VHF from Canberra. Stations have already been worked from as far away as Griffith, Deniliquin, Raymond Terrace, Cooma, Echuca, and Sydney as well as many others. Signals from the edge of the service area have generally exhibited a very slow fading characteristic, with a period of three or four minutes, however there is little point in running high power to access the repeater unless your receiver can more than match the repeater's extremely sensitive receiver. Experience has shown that the repeater hears slightly better than it talks.

The repeater uses custom designed circuitry with careful attention to those characteristics peculiar to repeater service. In particular, a receiver which is free from spurious responses, has a high overload margin, good sensitivity and low noise figure, and a transmitter which has very low spurious output, both in-band noise and harmonics. The transmitter and receiver are combined in an 8 cavity temperature compensated aluminium duplexer and fed to the antenna via 4 MHz band-pass filter. The antenna is 3 bays of 4 gamma matched dipoles fed in quadrature and is connected via 50 ft. of RG9 double screened coax. The control logic is TTL and CMOS and uses a PROM to store the callsign.

As with all projects of this type, many people assisted along the way to the final



Many willing hands make the final adjustments to the mounting hardware, while designer Peter Smith (left) looks on. Photo by Martin Hood VK1ZME

success of the project. Peter Smith designed and constructed the transmitter, receiver and antenna and generally carried the project when others lost interest. Martin Hood designed and built the control logic and machined most of the duplexer. John Tilley assisted with the detailed testing of the antenna. Norm Smith manufactured the antenna mounting brackets, Eric Piraner and Eddie Penikas were jointly responsible for site liaison, and a host of other people too numerous to mention helped in installation and in other ways.

The ultimate success of the project lies not so much in the installation of a repeater with phenomenal service range or of great technical elegance, but more in the use to which the repeater is put.

Plans already exist for using the repeater for divisional broadcasts, and doubtless other applications will suggest themselves. Finally users are reminded that the repeater is principally for use by stations which cannot communicate directly, and that if you time out you have talked for much too long.

VK1RG1 SPECIFICATIONS

Location:

Mt. Ginini, 40 km south-west of Canberra 147° 47' E, 35° 38' S.

Callsign:

VK1RG1.

Frequency:

146.35 MHz input, 146.95 MHz output (Channel 7)

Receiver:

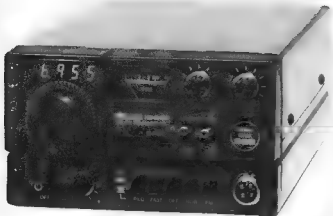
Input noise figure, 2.0 dB.
Mute threshold 0.05 μ V (approx.).
Sensitivity 0.1 μ V for 10 dB quieting;
0.25 μ V for 20 dB quieting.

Transmitter:

Power output 25 watts.
Spurious output. Less than -90 dB on 25 watts at \pm 600 kHz from carrier

Antenna:

3 bays of 4 gamma matched dipoles fed in quadrature (90° out of phase).
Beam width (horizontal) 20°-30°.
Azimuth pattern: Omnidirectional \pm 1.5 dB
Calculated gain. 7-9 dB over single dipole.



NEW IC245



The VFO revolution goes mobile with the unique ICOM developed LSI synthesizer with 4 digit LED readout. The IC245 offers the most for mobile on the market. The easy to use tuning knob moves accurately over 50 distinct steps and assures excellent control as easy as steering the vehicle. With its optional adapter the IC245 puts you into all mode operation on 12v dc power with a compact dash-mounted transceiver. In FM, the synthesizer channel frequency is displayed in 5KHz steps from 145-148MHz and with the sideband adapter the step rate drops to 100Hz from 144-145MHz. For maximum repeater flexibility, the transmit and receive frequencies are independently programmable on any separator. The IC245 even comes equipped with a multiple pin Moxa connector for remote control. The IC245 is a product of the revolution in VFO design from its new style front panel, to its excellent mechanical rigidity and large scale integrated circuitry. Your IC245 comes complete with mounting bracket, mic, English manual and VICOM 90 day warranty. Price \$475. Optional sat adapter \$130.



ITS CRYSTAL CLEAR!

The IC225S Australian model is a PLL synthesized rig with PROM for frequencies 145-148MHz. Simplex, duplex or duplex reverse is achieved by a flick of a switch on the front panel. This fabulous rig features ceramic downconverter, DC electronic infra switch, full wave protection and VICOM 90 day warranty. Your new IC225S comes complete with mic, mobile mounting bracket, plugs and dc cable. Matrix factory programmed for WIA bandplan repeater and simplex channels and a supply of spare codes for private channels is provided. Price \$260.

IC225S

The IC211 is the all mode PLL transceiver featuring twin electrically coupled VFO's, VOX, car monitor, noise blanker, AC/DC capability, built-in awr bridge and full coverage from 144-148 MHz. The rig is fully synthesized in 100Hz or 5KHz steps using the ICOM developed CMOS LSI Semiconductors include 81 transistors, 15FET, 14 IC 90 diodes and 1 LSI. The IC211 comes complete with mic cables, English Manual and VICOM 90 day warranty. Price \$795.



NEW NICAD PACK

This pack has been especially designed to fit neatly into the ICOM portable transceivers in place of the dry cells. It contains 10 nicad batteries (900mAh) together with a charger (13.8vdc) allowing the NICADs to be charged from a car battery or a bench power supply. Complete kit and instructions \$57.

THE MOST POPULAR FM PORTABLE!

The IC210 is the take-anywhere 2m fm portable which puts good times on the go. Change vehicles, climb a hill, take it on the boat: the ICOM quality communications go right along with you. Features fully collapsible antenna (with optional "rubby ducky") 15 channels, dual power (3w/400mw) crystals are the same as the C22 series. Your new IC210 comes complete with mic, carrystrap, dry cells, plugs, English manual, VICOM 90 day warranty and three popular channels. Price \$199. Rubber Ducky antenna \$12.

C202 2M SSB portable transceiver \$219
IC502 5M SSB portable transceiver \$219
C205 matching power supply \$119

PORTABLES

WARNING: Purchasers of Amateur gear may be asked to produce evidence of a license or indication that the purchaser is studying for an Amateur or novice examination. The law requires that a license be held for all transmitting equipment.

SPECIFICATIONS

GENERAL

Frequency Coverage *144.00 to 148.00 MHz
Modes FM (F3)
Supply Voltage *SSB (A3), CW (A1)
DC 13.8V $\pm 15\%$
Size (mm) 90H x 153W x 235D
Weight (kg) 2.7

TRANSMITTER

TX Output F3 10W
Carrier Suppression *A3, A1 10W (PEP), A1 10W
Spurious Radiation 40 dB or better
Distortion 60 dB or less below carrier
Microphone Impedance 600 ohms

RECEIVER

Sensitivity *A3, A1 0.5 microvolt input gives 10 dB S-N or better
F3 0.6 microvolt or less for 20 dB quieting S-N-DIN at 1 microvolt input, 30 dB
Squatch Threshold -8 dB or less (F3)
Spurious Response 60 dB or better

SYNTHESIZER

Frequency Range 144 MHz to 148 MHz
Step Size 5 KHz for FM
160 Hz or 5 KHz for SSB
Stability per C in the range of 10 to +60 C. -0.000145% per C

* Valid with SSB Adapter only

THE BEGINNING OF THE ICOM VFO REVOLUTION



IC211

ICOM

Head Office & mail orders...
139 Auburn Rd., Auburn, Vic. 3123 Ph: (03) 82-5398

VICOM Name your distributor at:

Ryeford: Jack Gillham, 23 Milling Street, Antwerp, Ph: 436 1271
Canberra: Darcob Electronics, 29 Colston Cr., Phillip Ph: 82-2981
Adelaide: Graham Carter, 22 Howe Ave., Enfield, Ph: 43 7911
Perth: Neveolux, 368 Harris Ave., Woodlands, Ph: 35 3232
Brisbane: Eric Electronics, 69 Wardell St., Dorrington, Ph: 35 4480

VICOM

VICOM the communication specialists VICOM the communication specialists

Sideband Electronics Sales

HF TRANSCEIVERS

ASTRO - 200 digital solid state 200 W.P.E.P.	P.O.A.
TRIO KENWOOD model TS 520 - D AC - DC 10 to 80 M.	\$550
TRIO KENWOOD model 520 - D AC only 10 to 80 M.	\$590
TRIO KENWOOD model TS - 820 - S AC only 160 to 10 M, with digital readout	\$980
TRIO KENWOOD model TS - 820 AC only 160 to 10 M.	\$850
TRIO KENWOOD DS 1 DC Converter	\$ 65
VFO - 820	\$145
DG - 1 Digital Display	\$160
YG 88C Crystal Filter	\$ 64
SP. 520 - 820	\$ 36

TRIO KENWOOD model TS - 700 - A FM-AM-CW-SSB transceivers. Full 144-148 MHz coverage, 10-Watt output, VFO controlled, self-contained, AC-DC operation. ~~\$650~~

TRIO KENWOOD model TS-600-A FM-AM. SSB transceiver full 50-54 MHz coverage 10 Watt output variable form 1 Watt to full power. VFO controlled AC-DC operation. Styling as TS-700-A. P.O.A.

TRIO KENWOOD model TR-7400 2 meter FM transceiver 10 to 25 watts output. Frequency range 144.00 to 147.995 MHz No. of channels 800. Double conversion superheterodyne sensitivity better than 0.4 UV for 20 DB. ~~\$385~~

KYOKUTO 2 M FM 15 W output transceivers with digital read-out and crystal synthesized PLL circuitry now tiwh 800 transmit and 1000 receive channels 5 KHz apart, covers all of 144-148 MHz, receive to 149 MHz. No more crystals to buy. Includes simplex, repeater and anti-repeater operation. **only \$310**

NOVICE OPERATORS

All above HF transceivers will be modified for low cost to suit novices. Requirements 27 MHz conv. x-tals in stock now for kenwood models.

IT IS HERE AGAIN, the well known SE-501 in new style case 15 Watt pep 23 AM SSB for as low as ~~\$215~~
Same model with AC built in supply and DC built in SWR power meter and many goodies. ~~\$260~~

ICOM

VHF TRANSCEIVERS SSB

ICOM model IC-202 2 M SSB portable transceiver 144-144.4 MHz ~~\$215~~

ICOM model IC-502 6 M SSB portable transceivers 52-53 MHz ~~\$215~~

USED EQUIPMENT

Collins KWM-2 - A in new condition with power supply ~~\$1,600~~
PM.2
6146 - b valves RCA new Large stock. \$10 each.

FDK MULTY QUARTZ with 24 channels 10 sets of crystals supplied 10 Watts, new style. ~~\$265~~

YAESU MUSEN model FT-101-E AC - DC transceivers 10 to 160 M with speech processor P.O.A.

YAESU MUSEN model FT - 301 P.O.A.

YAESU MUSEN model FT 301 - D P.O.A.

YAESU MUSEN model FT - 301 - S P.O.A.

YAESU MUSEN model FP - 301 P.O.A.

YAESU MUSEN FR 6-7. Uses Wadley loop principal ~~\$300~~

YAESU MUSEN model YC-500 P.O.A.

FREQUENCY COUNTERS

HY - GAIN ANTENNAS

14AVQ 10-40M verticals, 19' tall, no guys \$ 65

18AVT-WB 10-80 M. verticals, 23' tall no guys \$ 95

TH3JR 10-15-20 junior 3 el. Yagi 12' boom \$160

TH3MK3 10-15-20 senior 3 el. Yagi 14' boom \$220

TH6DX 10-15-20 senior 6 el. Yagi 24' boom \$250

HY-QUAD 10-15-20 cubical quad Yagi 8' boom \$250

TIGER ARRAY 204BA 20M4el. Yagi 26' boom \$250

BN-86 balun for beam purchasers only \$ 25

CUSH CRAFT ANTENNAS

A144-11 11 Element 2M-Yagi \$ 45

A147-11 11 Element 2 M Yagi \$ 45

A147-20 combination horizontal vertical 2 M \$ 70

A144-20 combination Yagi with matching harness circular polarization \$ 75

ANTENNA ROTATORS

Model CDR Ham-11 for all hf beams except 40 M \$200

Model CDR AR-22 L junior rotator for small beams \$ 65

KEN model KR-400 for all medium size hf beams with internal disc brake \$110

KEN model KR-500 for vertical control of satellite tracking \$110

All models rotators come complete with 230-volt AC indicator-control units.

6-conductor cable for KR-400-500 65 cents per metre

COAX CABLE CONNECTORS

PL-259 \$1.20

SO-239 Chassi Mount \$1.20

Male to male joiner \$1.20

Female to female joiner \$1.20

Angle connector \$1.70

T-connector \$2.00

COAX CABLE

RG - 8 - U foam filled per metre \$1.20

SWR METER

Twin meter model: Y.M. - I.E. 3.5 to 145 MHz prof quality \$ 28

DRAKE TV - 3300 TVI lowpass filter \$ 31

SSR-1 Receivers \$270

All prices quoted are net SYDNEY, N.S.W., on cash-with-order basis, sales tax included in all cases, but subject to changes without prior notice. ALL-RISK INSURANCE from now on free with all orders over \$100; small orders add 50c for insurance. Allow for freight, postage or carriage; excess remitted will be refunded.

Sideband Electronics Sales

For personal attention: 24 KURRI STREET, LOFTUS

P.O. BOX 184, SUTHERLAND, 2232

OPEN ON SATURDAYS TILL 12 NOON

TELEPHONE: 521 7573

PETER SCHULZ, VK2ZXL

NZART JUBILEE VK/ZL/OCEANIA DX CONTEST 1976 RESULTS

With the receipt of more logs than ever before in a VK/ZL/O DX Contest, this part of NZART's Jubilee Year Celebration must be considered a real success. Even so, the lack of logs from some areas—particularly the Americas and some European countries is unfortunate. As part of our Jubilee, Participation Cards have been sent to all who submitted logs (direct if IRC sent, or via QSL Bureaux), while Jubilee Plaques have been posted to single operator continental winners. What a pity that no awards were made in two areas!

The checking of logs, tabulation of scores, production of results, and the allocation of certificates has been a time consuming but worthwhile task. The use of almost 400 certificates indicates generous allocation of these. This is appropriate to the occasion and the fact that in some "areas", so many logs were prepared and submitted. Special NZART Jubilee Certificates will be sent to a few National Societies whose members supported the contest so well. NZART will again organize the VK/ZL/O DX Contest in 1978 while WIA (Australia) will do so in 1977.

Good DX and 73,

Jock White ZL2GX,
NZART Contest and Awards Manager.

RESULTS

PLAQUES AWARDED

	PHONE	CW
OCEANIA	AG6JFY	AG6JFY
AS-A	A2HLX	JA2BP
EUROPE	DL8NU	UP2NK
N. AMERICA	WBXK	W9S2R/3
S. AMERICA	LJ3HAK	No entries
AFRICA	9J2GJ	No entries

PHONE	CW
Africa	Asia
ZS2GJ	160
S. Americas	
LJ2HAK	170
Oceania	
AG6JFY	40284
KH8JL	17870
VR1AA	14087
ZS2RJ	1848
Asia	
CR9AJ	152
N. America	
P21AH	198
VE7IO	2343
VE7DO	60
XE1LLS	80
XE1DU	252
K2CW	227
W2GXD	24
LJ3BAR/W3	243
W3TV	147
AC4WSP	8
K6CO	848
W6IX	11680
WD6H	210
K3MNT/7	396
WB6LR	6272
W2WMT/O	4966
Oceania	
AG6JFY	22815
KH8JL	1583
KH8JL	11284
VR1AA	17172
N. America	
P21AH	198
VE7IO	1200
VE7GCO	60
XE1FL	88
W1EYK	4416
W2GXD	2240
K2CW	24
W3CWR/S	1634
W3S2R/S	5858
W3TV	1682
AC4WSP	8
W6CO	848
W6IX	11680
WD6H	210
K3MNT/7	396
K9DX	1245
AC3MR/K	225

EUROPE — CW

DL8NU	6400	UK2GKW	5594*
DL4PT	3700	UK2GAG	400*
DL0SK	1170	UK2GO	1130
DL1KB	940	UR2QD	967
DL0XT	231	UR2REN	352
DL2JB	196	UR2QA	200
DL1VB	80	UR2JH	27
DLJOC	check	UR2OI	48
DM2YK	2500	UR2JH	27
DM5UUL	180	UA4RZ	1287
DM5WUJ	check	UW4NP	707
DM3SIC	check	UA4PW	886
DM2CMF	check	UA4IU	245
UA4YEL	check	UA4RAA	204
EA2IA	42	UA4UAZ	48
FSCLM	20	UK4HDB	1485*
G3MAS	1100	UK4WAB	1111*
HABKCP	828	UK4FAA	18
HA6NP	84	UK4PNZ	check
HA7KLB	100*	UBSWE	3152
HP1IN	1729	UBSAC/S	2078*
OH6JW	2878	UY500	561
OH1PS/2	108	UBSVA	500
OH2LU	80	UBSUAT	405
OH7NW	2	UBSGBD	144
L21QO	1286	UT8MP	40
L22RF	40	UY12M	68
OK1ATE	222	UB6ARJ	32
OK2BKR	160	UB6LAY	24
OK1AEZ	159	UY50P	18
OK1WT	84	UB500	1
OK3TAB	32	UT50V	check
OK2BJO	28	UK5MAF	4427*
OK1AGM	84	UK5IAZ	1752*
OK1MGW/P	12	UK5WBG	1342*
OK2SLB	10	UK50BE	1238*
OK2YAX	8	UK5MBP	70*
OK2KOS	870*	UK5VAA	24*
OK1KBO/P	440*	UK5IAN	21
OK2BZ	580	UK50D	580
OZ3VE	189	UK50WS	40
OZ4PM	2	UV3CE	2844
OZ1ZE/P	2	UA3GCR	1793
OZ2E	check	UA3GM	940
SP3DO1	1808	UA3AAK	378
SP8BT	308	UA3AT	40
SP3QD	30	UA3DF	40
SP9KMQ	6	UA3TCH	28
SP4AS	check	UA3XD	8
Y06EX	89	UA3NG	3
YU2HDE	1364*	UA3TN	check
YU2CBK	80*	UK3ACM	1872*
SM4CCE	900	UK3KAA	1518*
SM4CAN	120	UK3AAC	50*
SM7FDO	84	UK3AAI	882*
SM5CMB	80	UK3DAH	774*
SM6AWJ	38	UK3SAB	50*
SM6QAG	10	UK3ABX	76*
SM6BUX	8	UK3TBF	264*
SM7CMV	6	UA6DL	820
UA1CS	2717	UK6LAX	472
UA1MU	408	UA6LBC	184
UC2ABT	380	UA6JAD	39
UP2BAR	60	UA6LE	48
UK2BAA	1690*	UA6JWW	check
UK2PRC	2*	UK6LDM	check
UQ2GW	408	UA6RBU	check
UQ2GQ	184	UA6LY	check
UQ2HO	105	UD6CC	150
UQ2GAB	24	UF6PCD	2
UQ2BM	18	UK6LEZ	2790*
UQ2GCN	8	UK6AAJ	1078*

EUROPE — CW

DL8NU	2880	DM2AYK	1819
DL0SK	1308	DM2CMF	79
DL1KB	1330	DM3SIC	174
DL0XT	386	DM2DEO	64
DL1SV	182	DM3YBF	48
DK0S	80	DM2AYO	check
DK3KD	48	DM3WAC	check
DK6AX	8	DM2BHC	check

EUROPE — CW (cont.)

EA4RV	30	UA1MA	2
F88B	6	UA1TA	2
F8TM	8	UA1BA	check
GM3CFS	289	UK1AA	2975
HASLZ	133	UK1NAA	132*
HASKKN	42	UK1TAA	24*
HASKNB	40	4L1RO	12*
HA7KLG	988*	UK1ADZ	8*
IC2GK	1068	UK2WAO	5*
LA2Q	6	UA2EC	284
LA3UG	60	UC2ABT	182
LZ1QO	1560	UC2AAC	182
LZ2RF	1020	UC2CBI	8
LZ1WH	80	UC2WAS	3*
LZ2GS	50	UK2WAO	5*
LZ1XZ	6	UP2NK	110
LZ1IF	2	UP2OU	110
LZ1IAA	902*	UP2ND	3
OE1TKW	8	UP2BFB	18
OH2BAH	388	UP2BF	8
OH7NW	288	UP2BAC	check
OH2CIC	182	UP2BOS	4950*
OH2LU	162	UC2BBS	3454*
OH2WJ	140	UC2BAS	1094*
OH1PS/2	80	UC2PAF	870*
OH4SKZ	30	UC2PBR	154*
OH5PT	24	CH2RJ	2
CH2RJ	18	UC2BQ	1001
OZ7BW	610	UC2BQ	805
OZ1VY	128	UC2BQ	2
OZ1W	115	UC2BQ	1552*
OZ1W	115	UC2BQ	150*
OZ4PM	2	UC2BQ	48*
OZ6XT	check	UP2BOS	878
ON4XG	468	UP2BOS	878
PH1ARS	24	UP2BOS	878
OK1TS	624	UR2RE	222
OK2OX	420	UR2Q1	132
OK2BR	357	UR2RJ	108
OK3MA	338	UR2ZP	8
OK1AH	178	UR2OD	114
OK1MIN	108	UA4HAL	1424
OK2B-X	98	UW4NP	1050
OK1DKR	784	UA4SM	754
OK2SLB	51	UA4HOM	818
OK2BJO	56	UA4BP	490
OK1YB	33	UA4HGP	10
OK1ATZ	24	UA4ADN	90
OK2PAE	24	UA4HGG	108
OK3RUB	18	UA4EYJ	85
OK2PQ	12	UA4HAT	88
OK3SY	2	UA4HBP	32
OK3PAH	4	UA4HGP	16
OK1MGW	50*	UA4HGP	16
OK1AOV	2	UA4HGW	19
OK2BPK	774*	UA4PAV	14
OK2SPS	2	UA4HCR	0
OK1KZ	2	UA4HCR	0
OK3TDM	2	UA4HCR	0
OK2YAX	2	UK4WAB	1355*
OK1IAR	check	UK4AAI	103*
OK1US	check	UK4TAA	6*
SP3DGI	570	UO5GR	306
SP6VC	54	UC2OWS	80
SP6ZAB	180	UP2BOS	check
SP6BZB	180	UP2BOS	check
SP6BGG	1770	UA3GM	860
SM5TA	448	UA3GAQ	440
SK6EJ	133	UA3LAL	360
SM5CNP	120	UA3DEA	210
SM6PQ	84	UA3JO	300
YU3NP	744	UA3JO	300
YU3NP	50	UA3ORQ	126
YU2CRK	36	UA3T	112
YU1AJ	check	UA3AA	98
YU1GMN	380*	UV3FO	60
YU2HDE	390*	UA3LC	36
YU3CSE	88*	YU3CSE	39
UA1AGK	306	UA3AFQ	24
UW1YI	225	UA3YR	10
UA1GW	140	UA3ET	10
UA1AHZ	60	LZ3TG	10
UA1AC	18	UA3ABD	10

* Denotes multi-operator.

EUROPE — CW (cont.)

UA3IAT	8	UB5VAW	182
UA3TAM	2	UB5UAT	154
UA3WJU	2	UB5CI	150
UA5, AR	2	UB5MBY	136
UA3EFC	1	JY5SO	133
UZ3ER	check	UB5 AM	132
UV3CM	check	UB5VY	126
UATCI	check	UK5MAF	100
UA3DHI	check	UB5VAL	95
UA5AZZ	check	UB5LDA	90
UA3AJA	check	UB5OAP	90
UK3DA	1565*	L/50Q	78
UK3ACR	1586*	JR5ICS	75
UK3XAA	819*	UB5VAF	65
LK3 BA	3441	JY3CMB	55
UK3AB	304*	UB5BAZ	55
LK3ABX	280*	UB5 BW	55
UK3QAA	182*	LBSOGB	44
LK3TBF	175*	UB5NQ	40
UK3DCF	162*	UT5PK	40
LK3AAC	90*	UB5QD	38
LK3EAZ	8*	UB5VLB	38
UK3TAU	check*	LBSOAC	32
LA6LON	218	UB5VWA	32
LA6PBA	128	UB5UAW	32
UA6LH	112	UB5GBO	32
W6RHM	108	JY4XMI	32
UA6LBO	80	UB5UCH	30
UB5LDD	72	UT5AA	12
UK6DAU	18	UB5TAM	8
UA5LAL	10	UB5QK	8
UA6, BX	8	UB5HQ	8
UA6YAK	check	UB5LB*	8
UA6AE	check	UB5QAD	84
UA5YBE	check	UT5LN	4
UK5LEZ	2794*	UB5LVC	2
UK5AAJ	1887*	UB5FAP	2
UK5AAU	462*	UB5PQ	2
UK5ARA	78*	UY5EK	check
UK5AJA	443*	UY5EL	check
UK5QBE	1544*	UB5BAW	check
UB5WBQ	1531*	UK5EAK	check
UK5JAZ	912*	UB5BAX	check
UK5MBP	75*	UB5ICK	check
UB5WLE	1278	UB5ZAT	check
UB5MBO	1066	UB5LBO	check
UB5BL	1167	UB5RAF	check
UY5DP	852	UB5KAK	check
UB5IDL	820	UB5UO	check
UB5NU	812	UB5WAL	check
UB5, AY	590	UB5ZBW	check
UT5LJ	106	UK5GOD	check
UB5ZAL	284	UK5ICA	check
UB5MET	216	UB5WAA	check
LBSLON	182		

ASIA — PHONE

JE1SSE	13135	JE1XKZ	8
JE1FJL	6259	JY1QGB	8
JE1BUJ	2560	JY1INM	4
JY1KRC	1932	JY1MPA	4
JY1HDO	1640	JY1ICK	2
JY1ZLO	1264	JY1QNX	2
JA1OHZ	1082	JY1PFD	1
JE1ADU	269	JA1HLR	1969
JE1CKX/1	278	JA1LHO	1320
JE1JB	872	JA1JDI	1296
JA1OV	264	H2-PD	990
JA1VZM	248	JA2XPU	484
JA1AAT	182	JA2ZAP	387
JE1GUT	164	JY2BQJ	286
JE1KAM	184	JA2ZTE	256
JA1PUK	181	JA2BHQ	248
JA1YVB	156	JE2BTK	224
JG1DUN	144	JA2NO	210
JG1E Q	120	JA1JLT/2	180
JA1NGB	120	JA1JLT	1632
JE1NCT	114	JA1JLW	114
JA1BST	90	JA2DML	80
JG1VPX	72	JA3PQA/2	78
JE1LKH	65	JY2MKV	30
JY1DYV	56	JA2HGA	44
JE1TSD	52	JA2JLV	24
JG1POB	36	JY2BDF	24
JG1E-B	27	JE2BZB	12
JY1FYW	27	JY2VUP	10
JY1KNS	24	JA2HNP	8
JA1JQY	18	JE2PUP	2
JY1RWM	16	JY2WQJ	2
JA1R-J	12	JA2HMF	1
JY1DCW	10	JY2DVA/3	18718
JY1SMT	10	JA3CMD	2820

ASIA — PHONE (cont.)

JA3YKC	2265	JY1EKS	96
JY3JUB	154	JA7YOB	60
JY3JUB	154	JY1FM	15
JA3YOV	312	JA7GAX	14
JA3BX	133	JA7UJU	3
JE3SEN	260	JY1MEH	3
JA3UB	168	JA6SW	1746
JY3MYT	100	JA6WQI	603
JA3LUB	100	JA6PBM	24
JA3IGU	52	JA6JX	1342
JY3GBE	44	JA6CWW	612
JE3TJR	21	JA6JBK	270
JA3OIH	10	JA6YAV	84
JY3BUN	10	JA6JSC	46
JY3CMB	55	JA6KUC	38
JA3VEJ	3	JA6AAY	3
JY3KWO	3	JA6JUX	1170
JY3FOU	2	JA6YUK	957
JY3KY	2	JA6FMH	360
JK3SON	2	JA6MT	350
JY3SCM	2	JA6IAB	280
JY3SIT	2	JA6CZJ	130
JY3IAU	1	JA6KUP	75
JA4CO5	5759	JA6WJN	24
JA4ENY	4312	JA6JZ	18
JA4BKL	3036	JA6GZ	2
JA4XMI	1195	JA6PDM	8
JA4ARM	939	JA6JZ	2
JY4BZL	405	JY4BZL	120
JA4CZM	270	UT7EAJ	1120
JA4SZ	258	UT7NW	328
JA4GTJ	144	UT7QAO	24
JY4GDR	102	UT7NI	12
JA4UDP	84	UK4JAA	364
JY4LWL	84	UY5PP	432
JA4NOD	66	UB4UF	2684
JA4WDQ	32	UA4MS	2608
JA4PQ	847	UB4UF	351
JA4SAUC	744	UY5TZ	813
JA5MOU	396	UY5WZ	273
JA5CHB	320	UA5CS	228
JA5IRY	230	UA5CBO	134
JA5RFY	182	UA5WS	120
JA5PXG	12	UA5CZD	75
JA6PQ	1866	UA5VI	40
JA6LBO	3120	JA6JAL	4
JA6WSB	1944	UA5CBW	2
JA6AT	1296	UA5FAL	2
JY6IRM	1008	UB5UO	check
JA6YUF	741	UB5YAU	check
JY6HVI	490	UK3AAN	12152*
JA6KAC	188	UK3CDM	190*
JA6WSB	1944	UA5CBW	2
JA6AT	1296	UK3CAM	72*
JY6IRM	1008	UK3FER	56*
JA6YUF	741	UK3MAA	33*
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2
JA6YUF	741	UK3WB	2
JY6HVI	490	UK3WB	2
JA6KAC	188	UK3WB	2
JA6WSB	1944	UK3WB	2
JA6AT	1296	UK3WB	2
JY6IRM	1008	UK3WB	2

ASIA - CW (cont.)

UK3AAA	616*	UA0JAW	312
LK3FE R	414*	UA0BAC	138
UK30AD	2*	UA0ML	125
UA0MI	3038	UA0AAC	125
JAD2BP	1743	UA0FAS	85
UK01X	596	UA0CZ	75
UA0CAY	860	UA0YAD	84
UK0CBW	634	UK0KAH	90
UA0CAD	526	UK0CBE	1404*
UA0CBO	329	UK0KAA	7*

SWL

F23060	252	UA5-1701093	748
BR515922	1856	LA3-14246	720
A8008	125	LA3-123238	640
UK30343	2400	LA3-1737355	608
DL9206	2040	UA3-123238	576
DE-M24/17701	840	LA3-127521	558
DE-19162	572	UA3-122552	540
D, P28/1582816	252	UA3-170846	540
D, P28/1542935	252	LA3-157342	578
D10/1516160	56	UA3-170751	416
DM735C-6	2758	UA3-170389	378
DM7215/1	770	UA3-170934	286
DM-EA-8053	612	LA3-118208	278
DM8405/N	432	LA3-170751	256
DM5721/G	18	UA3-170798	238
HA5-072	46	LA3-122540	234
HEB-JN	2812	UA3-15710	200
HE9EV	60	UA3-1271	200
I2-14713	2772	UA3-170808	200
IO-59651	1382	UA3-157343	174
IO-84889	952	UA3-15575	142
I2-55781	584	UA3-122543	110
4-62374	350	LA3-1707081	110
5-50281	156	UA3-12344	82
IO-60029	80	LA3-142843	32
II-88986	16	LA3-170183	32
OK1-11681	342	LA3-08543	5720
OK1-20350	2286	UA4-14817	2286
OK3-26327	236	LA4-085171	2128
OK3-28743	186	LA4-148227	21
OK2-14780	100	LA4-095216	324
OK1-5524	86	LA4-131155	70
OK2-16388	70	LA4-148106	26
OK2-28312	51	LA4-08781	check
OK3-18860	24	LA4-09578/MM	6116
ON-353	272	BS-0719	1162
NL-4275	664	UB5-068297	799
SM7-5755	200	BS-071343	700
UA1-16938	524	BS-072191	660
UA1-144291	392	UB5-0601464	594
LK1-1691	198	UB5-060805	572
UA1-1431	144	BS-05642	386
JA1-169185	120	BS-067725	352
UA1-144298	48	BS-073877	304
LA1-169185	6	BS-077329	280
UN1-068218	320	BS-073636	182
UN1-088358	75	BS-052606	72
JC2-06101	610	BS-071282	64
JC2-0101	208	BS-0732548	80
JC2-00838	140	BS-070284	50
JC2-00689	85	BS-05911	21
UP2-038521	1786	BS-073712	10
UP2-038196	1074	UB5-064402	8
UP2-036406	1368	BS-061202	8
UP2-0381524	1320	UB5-067800	8
UP2-0381524	810	BS-071282	64

UA5-1C555	656	JA5-1231/3	1512
UA5-154832	252	JA3-8943	1184
UA5-15424	336	JA4-30756	1343
UA5-084200	238	JA7-6824/7	2484
UA5-145234	210	JA8-2155	300
UA5-154880	132	UA0-107287	2688
UA5-145197	110	UA0-110100	2392
UA5-165694	110	UA0-11287	960
UA5-165694	check	UA0-124121	656
UA5-1541134	check	UA6-10833/0	520
JA1-18277	2646	UA0-107131	114
JA1-4576	954	UA0-10771	95
JA1-1176	432	UA0-107294	80
JA1-11702	120	UA0-12630	52
JA1-21002	108	UA0-13976	26
JA3-8783	2108		

The VK and ZL results appeared on page 28 of March 77 AR.-Ed.

VHF-UHF AN EXPANDING WORLD

Eric Jamieson, VK5LP

AMATEUR BAND BEACONS

VK0	VK0MA, Mawson*	53.100
VK1	VK1RTA, Canberra	144.475
VK2	VK2WI, Sydney	52.450
	VK2WI, Sydney	144.010
VK3	VK3RTG, Vermon	144.700
VK4	VK4RTL, Townsville	52.600
	VK4RTT, Mt. Mowbray	144.400
	VK4RBS, Brisbane	432.400
VK5	VK5VF, Mt. Lofy	53.000
	VK5VF, Mt. Lofy	144.800
VK6	VK6RTV, Perth	52.300
	VK6RTU, Kalgoorlie	52.350
	VK6RTW, Albany	52.950
	VK6RTW, Perth	145.000
	VK6RTW, Perth	145.000
VK7	VK7RNT, Launceston	52.400
	VK7RTX, Lonah*	144.900
	VK7RTW, Lonah	432.475
3D	3DAA, Suva, Fiji	52.500
JA	JD1YAA, Japan	50.110
HL	HL5WI, South Korea	60.110
KG6	KG6JDX, Guam	50.110
KH6	KH6EQI, Hawaii	50.104
ZL1	ZL1YHF, Auckland	145.100
ZL2	ZL2MHF, Upoor Hutt	28.170
	ZL2VHP, Palmerston North	52.500
	ZL2VHF, Wellington	145.200
	ZL2VHP, Palmerston North	145.250
	ZL2VHF, Palmerston North	431.850
ZL3	ZL3VHF, Christchurch	145.300

A letter from Roger VK2ZTB advises the Mawson beacon VK0MA is still operational, so it has been listed again. Advice also comes via "QRM" that the Devonport beacon VK7RTX has now been shifted to a new site at Lonah where the 432 MHz beacon and the FM repeater are located, bringing all three together.

A letter from Jeff Pages, VK2BYY, the VHF and TV Group Secretary, advises of the establishment of a new beacon at the QTH of Barry Goodman VK2ZAC at High Range near Mittagong, and is operating on a frequency of 144.120 MHz with the call sign VK2RHR, which it identifies every three minutes on MCW. The transmitter runs 10 watts into five vertically stacked half-wave collinear. The purpose of the beacon is to evaluate High Range as a possible permanent repeater or beacon site. Reports covering a period of about a week would be appreciated, and may be forwarded to Barry at P.O. Box 318, Mittagong, N.S.W. 2575. The establishment of an ATV repeater in Sydney is being investigated.

In response to a request from Graham VK8ZCJ in Darwin for a listing of TV stations suitable for beacon purposes around the 6 metre band, I have this month included a fairly extensive list, and I am indebted to Graham for passing on to me the details of the various Asian TV stations shown listed herewith. It is not anticipated these will be repeated each month, but certainly would be updated where possible as the two equinoxes approach, these being the best periods for TEP and F2 propagation from the north and north-east. I suggest those who are interested should remember the date of this listing or copy them on to a more easily used medium, and kept by the 6 metre equipment.

There may be those who have a bit of a smile when they read of some of the exotic places listed for the beacons, but let me assure you they are listed in all seriousness, and the seriousness paid off for Peter VK5ZPW who lives at Angaston, some 40 miles approximately north of Adelaide. Peter telephoned me with the news that on Sunday, 27th March, he copied the Hawaiian beacon KH6EQI on 50.104 for 2 hours, 0145 to 0345Z with signals peaking

Graham VK8ZCJ continues in his letter to say he has only recently been able to get back on the air following Tracy, and uses an FT650B to a 5 el yagi at 35 feet. On 2 metres a VK4ZWP transverter to a QOE06/40 linear with a 10 el yagi at present on the ground! The first JA opening to Darwin for 2½ years occurred on 13/3 beginning at 0710Z and the last contact at 0808Z, and Graham worked 18 stations in JA with signals peaking over 59. Brian VK8VJ and Neil VK8ZCU were also working the JA's.

Graham's other activities around 6 metres was the reception of Russian/Chinese TV video on 49.75 MHz on March 2, 3 and 5. Openings were late in the evening around 2100 local (1130Z), with very strong signals. Mike VK8ZMA reported viewing TV on Channel 0 on 2/3. No amateur signals have been heard on evening TEP.

TV video has been heard on 49.75 and TV audio on 53.75. Wide band FM was also heard on 49.305 with Japanese language on 13/3, in association with the JA opening, but no TV was heard on 49.75, nor any sign of the JA beacon on 52.500.

For the sake of the record Graham mentioned he worked ZL, P29 and all VK States over the Christmas period, over 200 different stations were worked, and he ran up 130 contacts on 28/12/76. The most regular beacon" into Darwin was Wagg Channel 0, and the VK2WI beacon on 52.450. On January 1 he heard JA's via Es at 0300Z, also ZL TV at 0500Z, both were triple hop Es, but no amateurs were worked in either area.

To conclude the Darwin scene Graham mentions Brian VK8VJ has an FTV650 on 6m to 8 elements, and a TS700 on 2m to 6 elements. Neil VK8ZCU has an FT620 on 6m to 4 elements.

Referring back to Roger Harrison VK2ZTB and his letter, he encloses a clipping from QST of January 1977, which mentions trans-equatorial signals being heard on 146 MHz by YV5ZZ in Venezuela from LU7DJZ in Argentina. This followed as a result of hearing fluttery signals prior to AOS for Oscar 7 on orbit 9062A on 8/11/76. Ed YV5ZZ reasoned that TEP could be extended as high in frequency as 2 metres. Upon listening on the 145.9 uplink band he heard very plainly, about 6 dB above noise, the uplink signal of LU7DJZ. The signal displayed the characteristic flutter usually associated with TE and there seems little doubt that TEP was responsible for reception of the 2 metre uplink transmission of LU7DJZ. Path length 3100 miles. YV5ZZ heard no US stations. Next will come schedules between the two stations in the hopes of making what must be the first 2 metre TEP contact.

Roger comments: "The signals in question are no doubt supported by Class 2 (i.e. night-time) TEP considering the time, frequency and fading characteristics. Considering the VK scene, Darwin is in a prime position for 2m Class 2 TEP to JA. The Ionospheric Studies Group of WRE operated beacons from Darwin on 46, 72,

86 and 102 MHz which were monitored in Yamagawa in Southern Japan, until cyclone Tracy took them away. The 102 MHz beacon was audible at good S/N ratios in Japan for considerable periods around the two equinoxes.

"As Class 2 TEP occurrences increase with increasing solar and ionospheric activity, we should see an increase in the possibility or probability of 2m TEP in the next few years. The terrestrial 2m record could be gained by a VK-JA QSO on 2m via TEP as well as providing some useful addition to research on TEP and the ionosphere. A station having moonbounce capability at each end could almost certainly make the grade, but such sophistication is not really necessary. Run lots of power to the biggest antenna you can raise, and run regular skeds during the hours of 8 p.m. to midnight local time during the equinox periods, as well as other times if it can be arranged. See my original articles on TEP in AR, early 1972."

Those are wise words from someone who should know, and it could well pay the boys in Darwin and North Queensland to consider the upgrading of their 144 MHz capability to the highest practicable limit for what could be an outstanding experience one day.

GENERAL NEWS

In the February issue of "Eastern Zone News" from VK3 is an interesting article on "Amateur Radio in Japan" by George Francis, VK3HV. A few items are worth mentioning here. The JARL was re-formed on 29/7/1952, resuming operations with 30 active stations. In 1972 there were 140,000 stations, and at present there are over 450,000 licensed. All stations must be approved before coming on the air for the first time by a Government inspector (RI). If later a change of equipment takes place, a new application must be made, and only after a further station inspection and granting of permission, may the changed equipment be placed on the air. The JARL is now authorised to certify station equipment, so long as its power is under 10 watts, thus eliminating the need for a State inspection, and most certainly a painstaking wait. However, for changes in the frequency bands previously licensed, type of emission, antenna or output power, a new application must be made in the normal way.

The Japanese 6 metre allocation is 50 to 54 MHz with phone permitted between 50.1 and 52.5, with 51.009 MHz the calling frequency. On 2 metres the allocation is 144 to 146 MHz, 144.32 to 145.48 for FM and phone, calling frequency 144.480 MHz. The 70cm band extends from 430 to 450 MHz.

Amateur radio in Japan has a current annual growth rate of just under 20 per cent, and Ministry officials have stated that the sharp increase reflects the spread of scientific knowledge in Japan. Simplification of the licensing examination system has helped to boost the numbers of operators in all age groups.

All very interesting, George. We take this opportunity, too, to wish you a happy

stay in New Guinea. George left Morwell in February for a two year stay in that country, and has taken equipment with him and will be active on all bands from 160 to 2 metres inclusive. His address will be P.O. Box 1105, Boroko, Papua New Guinea.

Col VK5RO had an interesting crossband contact recently, when on 20/3 he worked at JH6 station who was on 6 metres, and Col was on 10 metres!

Charlie VK6JD will be operational from Norfolk Island on 6 metres with an FT620B to a 5 element beam. . . VK9ZM from Willis Island is now off 6 metres. . . There will be no 6 metre operation from Macquarie Island for the time being.

EME REPORT

Lyle VK2ALU writes in the "Propogator" that tests were scheduled for 26/2 with W4WD and W6ABN. "Nothing was heard from W4WD. Signals from W6ABN were not loud enough to make a contact possible, and he has since advised by mail that his gear is not quite up to moonbounce standard yet.

"A half hour VK2AMW CQ period then followed, during which we were called by a weak station which we could not identify. He faded out after 10 minutes. Other stations were heard during this period, carrying out their scheduled tests on 432.040, 432.050 and 432.060 MHz. Our echoes were peaking up to 6 dB over noise during these tests."

Lyle also makes a request for 70cm SSB contacts. He can operate between 432.100 and 432.200 MHz with 200 watts PEP transmitter output and approximately 3 kW PEP ERP from antenna. His address is as per the Call Book and would appreciate hearing from anyone interested. He may also be able to organise RTTY on above frequencies, with 100 watts of transmitter output, if anyone is interested.

From the Annual Report of the EME Project Group, Lyle reports that during the 12 months to March, 48 EME tests and 11 CQ periods were scheduled for VK2AMW. They had contacts with 12 different stations, bringing their operating total now to 25 stations in 10 countries, but so far have not been able to contact a 432 MHz station in VK by EME path.

Several dozen stations are now being regularly scheduled over the EME test week-ends each month in addition to QSO's which take place as a result of CQ's. New stations are appearing nearly every month, and the band segment in constant use extends from 432 000 to as high as 432 060.

VK2 M.D.-WINTER VHF FIELD DAY

Jeff VK2BYV has written enclosing details of the annual VK2 VHF Mid-Winter Field Day Contest to be conducted over the Queen's Birthday holiday week-end, 11th to 13th June. Details are published elsewhere in this issue.

That's all for now. Closing with the thought for the month: 'Everybody is ignorant, only on different subjects.'

73 The Voice in the Hills. ■

LETTERS TO THE EDITOR

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publishers.

The Editor,
Dear Sir,

RE: CHESS VIA AMATEUR RADIO

I was surprised to read of Chess via Amateur Radio in the January 1977 issue of AR, because of an episode that happened to Len VK3LP and myself a couple of years ago.

We had been enjoying chess contacts for many months, when we were separately contacted and "warned off". I was contacted by an inspector from the Radio Branch and told that someone had monitored our transmissions in Queensland, and (1) that our operating procedure was not correct, and (2) that chess over amateur radio was "not allowable".

To say the least, I was amazed at both of these, because we had taken pains to ensure full standard procedures, including the VK prefix, and because chess is, I believe, an activity within the ambit of allowable activities and conversations.

The inspector did ask me if I wished to contest their comments, but at that stage I was so disturbed at being contacted by them, that my only thought was to quit, and not rock the boat. Having stewed over it for two years, and having seen that January 1977 article, I believe now that I should have taken them up.

I have also found that there are a small number of others who are interested in this interesting activity. I therefore think that it is time for a definite ruling from someone in "Authority" that chess IS an activity that can be conducted. I guess that this action becomes the job of Federal Council, so I would ask that they consider it.

There is no need to regulate operating procedures, because these are adequately covered by our current processes. There are also two standard international methods for writing down chess moves, and as these are known by most chess players, there is no need to formalise that these be used over the air.

I would also ask that if there are any others interested in this activity that they write me a note. Bands (HF) used have been 7.0 and 14.0. There is a good case for VK activity on 3.5.

Bruce H. Bussenschutt VK5OR ■

(Playing chess on the air is not officially regarded as being a suitable subject for amateur communications in VK. This is an expression of opinion by Central Office. Perhaps amateur radio "on air" discussion subjects are more closely scrutinised these days vis-a-vis claims being made by the exponents of "CB".—Ed.)

The Editor,
Dear Sir,

Reference the letter published in February AR by Rodney Champness VK3UG. As Mr.

Champness seems intent on procuring a reply to criticism levelled by him at the various groups involved with morse practice broadcasts, I feel I should oblige. His first letter did not go unnoticed, incidentally, but it was the consensus among my colleagues involved in morse practice in VK2 that we should ignore such correspondence until the author chose to "put his money where his mouth is". However, two letters were just too much, hence my reply.

There are several morse practice broadcasts originating on various bands by various divisions—perhaps the two most commonly known are the VK2 and VK5 divisional broadcasts originating at 0930 Z and 1030 Z respectively, on or about 3550 kHz each evening. I believe there is a limited service in VK4 also. As far as I know there is no service from Mr. Champness's division—VK3. In VK2 the practice broadcasts originate from one of eight stations each night of the week with one station spare for contingencies. These operators are generally not mad keen CW exponents but just ordinary amateurs who wish to provide some help to those would-be amateurs needing CW practice.

It is quite wrong to assume that we have not taken the trouble to consult the RFMD regarding the method of generating morse for the exams. We have not only done this, but we have access to and indeed regularly broadcast the actual tapes previously used by the RFMD in the AOC and NAACP exams to give candidates some idea of the real thing. We would like very much to be able to present this realism all the time, but we can't all be expected (can we?) to shell out 300 or more dollars for a keyboard generator with all the frills that the RFMD possesses, and with which these tapes are prepared. The 80Mx VK2 sessions are practice sessions designed not to teach more but rather to provide regular practices (it is up to the individual to learn the characters, etc.). We commence at 5 w.m. usually and work up, providing practice in a variety of formats and yes, styles (which is not a euphemism for bad morse), but unless you are going to have everyone use a keyboard preset at certain speeds, weighting, etc., uniformity is impossible. In any case, I would think it could be quite boring to those listening regularly.

Finally, from what we can gather, by all accounts we have quite a reasonable following and play a significant part in the success of many attempting and gaining the AOC and NAACP.

I think that is a pretty reasonable achievement.

Mark Salmon VK2DI,
Co-ordinator, VK2 Division,
Morse Practice Broadcasts. ■

QSP — AFTERTHOUGHTS

WIANEWS March AR, 3rd last paragraph—Japanese CB are of course on 27 MHz not 21 MHz as printed.

TECHNICAL CORRESPONDENCE

The Editor,
Dear Sir,

RE: CIRCUIT BURGLAR ALARM — MARCH AR

I regret to say that the bridge rectifier circuit is incorrectly drawn, the rectifier symbol should be rotated 90 deg. clockwise for all connections to be correct.

This occurred due to an interruption at the time, but I don't know how it was missed when checking on completion, maybe getting too old for these exercises! Sorry about this error

Ed Manifold VK3EM ■

CONTESTS

VHF MID-WINTER FIELD DAY CONTEST, 1977

Conducted by the VHF and TV Group, NSW Divs on the WIA.

The group is conducting this contest over the Queen's Birthday long week-end. Points are biased towards tunable operation. Starts 1200H EAST, SATURDAY, JUNE 11. Finishes 1200H EAST, MONDAY, JUNE 13.

RULES

1. All VHF bands 52 MHz and above may be used
2. You may work a station once per band per clock hour.
3. The minimum contact distance is 1 km.
4. Crossband, HF and repeaters may be used to set up contacts, but not for scoring.
5. Oscar 6 and 7 are not classed as repeaters for scoring purposes.
6. Serial numbers, callsigns, band, time, mode and location of each station worked must be recorded in your log book.
7. Single Operator Entrants — You must perform ALL operating personally. One log keeper is allowed, plus unlimited moral support.

SECTIONS

- 1a. Multi-operator Field Stations. 1b. Single-operator Field Stations.
 2. Mobile Stations
 3. Home Stations
- The best 6 consecutive clock hours and the best overall score in each of the above sections.

ENTRIES

Entries must give the callsign and the total points claimed from each station worked; there is no need to submit complete log book extracts. Include a cover sheet and the usual signed declaration.

Entries must reach the VHF and TV Group at 14 Atchison Street, Crows Nest, N.S.W., 2065, before August 1, 1977.

SCORING TABLE

km	6m- FM TUNE	2m- FM TUNE	70cm TUNE	ATV	576 SP
1-50	2	3	1	3	4
51-100	4	6	2	6	10
101-150	10	15	5	15	30
151-200	20	30	10	30	60
201-250	35	75	15	45	100
251-300	40	60	25	75	200
301-350	45	35	105	400	2000
351-400	40	35	105	400	2000
401-450	20	30	75	225	500
451-500	50	75	125	375	600

OSCAR 2-10 Transistor 20 VK2/ZL, 50 other countries
70-2 Transistor 50 VK2/ZL, 100 other countries

ATV series numbers must be exchanged on sound and vision.

ATV NEWS

KEVIN CALLAGHAN VK3ZVJ
PETER COSSINS VK3BFG

INTRODUCTION

This is the first of a possible series of Amateur Television reports. The series will be co-authored by Peter Cossins VK3BFG and Kevin Callaghan VK3ZVJ. We hope to compile as much information and news as possible from all States, and to get this news we would appreciate as much feedback as possible from all ATV communities. Most of the information published will be news and happenings from each area, but there will also be technical articles pertaining to ATV.

VK1, VK2, VK4 AND VK5

Could you please contact either of the authors as to where the activity is, frequencies, localities, liaison frequencies, etc., so that news and notes may be included in this column.

VK3

At this stage we know of activity only in Melbourne and surrounds. Liaison is on 147.63 MHz FM with a secondary frequency on 147.7 MHz. There are approximately 63 stations capable of receiving, and of these 25 are capable of transmitting. There are undoubtedly many more viewers. Activity is not on an organised basis and QRM is not unknown. The activity is normally on the simplex frequency of 426.25 MHz vision and inter-carrier sound on 431.75 MHz. Only three or four stations can use the secondary ATV frequency of 444.25 MHz. This secondary frequency is planned as the input frequency of the proposed VK3 ATV repeater.

VK6

Activity in Adelaide is on a simplex frequency of 442 MHz vision and 446.5 sound. The known stations transmitting are VK4AO, KG, HD, ZBE, ZFX, ZEF, ZOF, GG. All stations can transmit inter-carrier sound. The liaison frequency is 53.5 MHz AM. All stations can receive 576 MHz ATV, the proposed repeater output frequency.

VK7

In Northern Tasmania, Winston VK7EM receives and transmits. Tony VK7AX is pre-

paring to join in. Frequencies are the same as VK3. Working into VK3 is possible during the summer season. We believe that there is also some activity in Hobart. Information please.

GENERAL NEWS

Through this series we hope to join together the various groups so that designs, equipment and contacts, we hope, can be exchanged. Undoubtedly given the right conditions, ATV DX can be worked over many hundreds of kilometres.

ATV repeater tests have been conducted in Adelaide and an initial test has been conducted in Melbourne. Repeaters in both States are planning on 70cm input and 50cm output.

Most receiving stations use the VK2ZIM converter either Mk 1 or Mk 2 versions. Antennas are usually 11 element Yagis, W0EYE 15 element Yagi's or Collinear arrays.

Transmitters range from modified commercial UHF mobiles or base stations, home made or solid state exciters and amplifiers, with series or grid modulation, even screen modulation is in use. The D4LB system from VHF Communications is also very popular. Modulation of a 2 metre final and then using a Varactor tripler has also been tried and works.

Video signals range from test signals to Color cameras and Video tapes. The small closed circuit vidicon camera is very popular and inexpensive. Some of the TV stations have made available their old black and white equipment which has become redundant since they went to color. This has been available at very cheap prices. Many stations are getting very elaborate with their video facilities and can transmit a number of cameras with very professional results.

Don't forget in VK3 to watch the Ron Harrison VK3AHJ ATV segment in the Sunday morning broadcast on VK3BWI at 10.30 East.

AWARDS

COLUMN

Brian Austin, VK5CA

P.O. Box 7A, Crefters SA, 5152

RULES FOR WANCA

1. "Worked All Norwegian Communes Award" is issued by the Vadsø Society of NRRL to all amateurs and SWLs.
2. The award is issued for contact with 25 different Norwegian communes. "Basic" — WANCA MIXED — and thereafter "Stickers" each additional 25 communes contacted till all communes contacted. At present 454 communes and 5 Norwegian arctic/antarctic areas. For WANCA class ALL, all Norwegian communes and 3 of 5 Norwegian arctic/antarctic areas must be contacted. A special award will be issued to all who can confirm contact with all Norwegian communes and all Norwegian arctic/antarctic areas. Only contacts made on or

after 1st January 1975 will count for WANCA.

3. All band, modes may be used. No cross-band or via repeaters. QSO's via Oscar count. Minimum report RST 338 RS 33.
4. Mobile or portable contacts valid, but QTH must be stated during QSO, or printed on QSL card.
5. QSL card not required, log data count.
6. The award fee is nkr 30 for "Basic" — WANCA MIXED — award and nkr 10 for each "Stickers". No fee for blind-handicapped amateurs/SWL's.
7. "Record Book" listing all Norwegian communes and areas, available from Award Manager WANCA for nkr 15. Together with the "Record Book" the Directory of Post Offices will be sent. The Directory of Post Offices list all Norwegian Post Offices and their commune belongings. No fee for blind-handicapped amateurs/SWL's.
8. In addition to "Basic" certificate — WANCA MIXED — the following certificates are issued:
WANCA — CW: Only contacts made on CW count.
WANCA — SSB: Only contacts made on SSB count.
WANCA — RTTY: Only contacts made on RTTY count.
WANCA — SSTV: Only contacts made on SSTV count.
WANCA — NOVICE: Only contacts with LB stations count.
WANCA — MOBILITY: Only contacts with mobile or portable stations count.
WANCA — SWL: For SWL's. All band/mods count. Mobile or portable contacts count.
For WANCA — CW/SSB/RTTY/NOV-ICE/SSTV. Mobile or portable contacts do not count. Any band may be used.
WANCA — CW/SSB/RTTY/SSTV/NOVICE/MOBILITY are only issued to holders of WANCA MIXED. No fee for these certificates, if applied for together with WANCA MIXED or together with applications for "Stickers" for WANCA MIXED. Otherwise a fee of nkr. 10. No one may apply for higher number of communes worked than one have on WANCA MIXED on these awards.
9. All fees WANCA/"Record Book" contributed to LASLG's Fund for Norwegian Blind-Handicapped amateurs.
10. Awards Manager will help anyone with identification of commune belongings. If call, full address listed on a sheet of paper and forwarded with 2 IRC.
11. All applications should be made according to "Record Book" signed by two amateurs and forwarded with the fee to

Award Manager WANCA,
Sverre J. Schmidt LA1QK,
P.O. Box 3,
N-9801 Vadsø, Norway.

ELECTRONIC ENTHUSIASTS EMPORIUM

POPULAR INTEGRATED CIRCUITS IN STOCK

CA3012	4.60	CD4026	3.30	CD4724	3.85	LM380N	2.75	MC1496K	2.75	UAA198	3.25	
CA3013	3.80	CD4027	1.05	CD40097	1.80	LM381A	3.20	MC1580G	6.75	UA723C	LM723	
CA3018	3.50	CD4028	1.80	CD40098	1.80	LM382N	2.60	MC1553	17.50	UA757	3.80	
CA3023	6.80	CD4029	2.65	CD40112	2.30	LM387N	2.75	MC1648P	4.90	ULN2208	2.45	
CA3028A	2.60	CD4030	2.60	CD40115	2.20	LM387N	2.75	MC1648P	4.90	ULN2209	2.45	
CA3035	5.20	CD4031	4.70	CD40119	2.90	LM387N	2.75	MC1648P	4.90	ULN2211	2.10	
CA3039	2.10	CD4032	2.35	CD40194	2.90	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3046	LM3046	2.50	CD4040	2.50	CD40195	2.90	LM387N	2.75	MC1648P	4.90	7400N	85
CA3053	2.10	CD4041	2.50	DM8097	1.90	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3059	8.40	CD4042	1.95	HEF	see "CD"	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3060	8.40	CD4043	2.25	LM387N	2.75	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3069	4.60	CD4044	2.35	LM387N	2.75	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3080	2.10	CD4045	3.20	LM387N	2.75	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3081	2.70	CD4046	3.20	LM387N	2.75	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3082	2.70	CD4047	1.95	LM387N	2.75	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3083	2.90	CD4048	.80	LM387N	2.75	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3086	LM3086	CD4050	.90	LM387N	2.75	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3092	2.90	CD4051	2.25	LM387N	2.75	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3095	6.90	CD4052	2.25	LM387N	2.75	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3097	18.00	CD4053	2.25	LM387N	2.75	LM387N	2.75	MC1648P	4.90	7400N	85	
CA3102E	.50	CD4058	1.45	LM351A	2.60	LM733CH	1.20	SL812C	9.50	74C01	1.95	
CA3127E	2.50	CD4059	1.95	LM3511H	3.60	LM741CN	75	SL821C	9.50	74C02	1.95	
CA3128E	9.90	CD4060	6.0	LM3512H	3.60	LM752CN	2.70	SL822C	17.40	74C03	1.95	
CA31307	2.25	CD4070	.55	LM3517K	6.90	LM761CN	2.50	SL823C	26.90	74C04	1.95	
CA31407	2.50	CD4071	.55	LM3518H	6.90	LM762CN	2.50	SL824C	8.90	74C05	1.50	
CA3800	2.30	CD4072	.55	LM3819H	7.25	LM783CN	2.80	SL830C	8.90	74C06	1.50	
CD4000	.55	CD4075	.55	LM3819H	7.25	LM783CN	2.80	SL830C	8.90	74C07	1.50	
CD4001	.55	CD4076	1.25	LM3200K	6.90	LM4549A	2.50	SL841C	10.90	OL31	.90	
CD4002	.55	CD4077	1.25	LM3207	6.90	LM488N	6.90	SL849C	12.60	RL4484	.38	
CD4006	2.30	CD4081	.55	LM3222N	4.50	LM488N	8.75	SL901B	3.90	RL5023	.35	
CD4007	.55	CD4082	.55	LM3223N	4.50	LM4891N	9.00	SL903B	3.90	RL5037	.35	
CD4008	1.50	CD4083	1.85	LM324A	4.50	LM4891N	9.00	SL1310	1.90	FND500	3.50	
CD4010	1.50	CD4083	1.85	LM325N	4.50	LM3028	CA3028	SL2046	1.20	9001	1.90	
CD4011	.55	CD4084	1.85	LM325N	4.50	LM3046	LM3046	SL2046	1.20	9002	1.90	
CD4012	.80	CD4085	1.85	LM326N	3.70	LM3068	3.75	SP8515	15.90	9001	2.90	
CD4013	.80	CD4086	1.85	LM3400K	4.95	LM3800	1.75	TA4300	2.90	N9N71	2.90	
CD4014	2.40	CD4087	1.85	LM3502T	2.70	LM3905	3.90	TBA570	2.90	NSN74	2.90	
CD4015	2.40	CD4088	1.85	LM3503A	4.50	LM3905	3.90	TA4300A	4.90	11C90	18.50	
CD4016	.80	CD4089	1.85	LM358N	3.20	MC1035P	2.90	TBA810A	4.90	11C90	18.50	
CD4017	2.25	CD4090	1.85	LM370N	4.95	MC1312N	4.90	TR1756A	3.90	93490	14.50	
CD4018	2.25	CD4091	1.85	LM372N	3.90	MC1349A	4.90	TCA220	2.25	2168-2	3.75	
CD4019	2.25	CD4092	1.85	LM372N	3.90	MC1351P	10.75	TCA220A	2.25	2168-2	3.75	
CD4020	2.30	CD4093	1.85	LM372N	3.90	MC1350P	1.95	TCA420A	4.90	S1863	17.60	
CD4021	2.30	CD4094	1.85	LM373N	4.70	MC1351P	3.90	TCA420A	4.90	S5024F	15.00	
CD4022	.55	CD4095	1.85	LM373N	4.70	LM3514H	1.40	TCA470	6.90	7905CP	2.90	
CD4023	.55	CD4096	1.85	LM377N	3.90	MC1468L	6.90	TDA1005	1.50	7282CP	.90	
CD4024	1.75	CD4097	1.85	LM377N	7.56	MC1468L	LM1468	UA170	2.25			
CD4025	.55	CD4098	1.85	LM377N	7.56	MC1468L	LM1468	UA170	2.25			

POPULAR SEMI-CONDUCTORS IN STOCK

7400	.48	7483	2.30	74LS28	4.75	74LS174	2.70	BD238	1.80	2N3568	.95
7401	.48	7485	2.95	74LS196	7.50	74LS175	2.70	BD247	2.80	2N3568	.95
7402	.48	7486	.85	82S23	8.85	74LS181	6.50	BD438	2.80	2N3569	.85
7403	.48	7489	4.90	82S24	8.85	74LS181	4.50	BF173	1.25	2N3638	.85
7404	.48	7490	.60	82S29	6.50	74LS182	4.50	BF175	1.25	2N3638A	.80
7405	.48	7491	1.80	74LS200	.55	74LS193	4.50	BF194	.85	2N3642	.55
7406	1.09	7492	1.20	74LS201	.55	74LS194	2.60	BF200	1.30	2N3643	.55
7407	1.09	7493	1.20	74LS202	.55	74LS195	2.60	BF201	1.30	2N3644	.55
7408	1.09	7494	2.20	74LS203	.55	74LS196	2.60	BF211	1.50	2N3731	5.95
7409	.48	7495	1.85	74LS204	.55	74LS221	2.50	BF212	1.50	2N3731	5.95
7410	.48	7496	2.15	74LS205	.55	74LS222	2.50	BF213	1.50	2N3731	5.95
7411	.54	74100	3.85	74LS206	.55	74LS223	2.50	BF214	1.50	2N3731	5.95
7413	1.15	74107	.85	74LS207	.80	AC125	1.80	MPF131	1.85	2N4349	.85
7414	2.70	74121	1.20	74LS211	.55	AC126	1.80	MPF132	1.85	2N4350	.85
7415	1.09	74122	1.20	74LS212	1.20	AC127	1.80	MPF133	1.85	2N4351	.85
7417	1.15	74123	1.40	74LS213	2.95	AC128	1.80	MPF134	1.85	2N4352	.85
7420	.48	74132	.80	74LS220	.55	AC132	1.50	MPF102	.85	2N4360	.85
7422	.85	74141	1.50	74LS221	.55	MPF103	1.50	MPF104	1.10	2N4361	.85
7425	.85	74145	2.95	74LS222	.55	MPF104	1.10	MPF105	1.10	2N4362	.85
7428	.70	74150	.30	74LS227	.80	AD148	2.80	MPF106	.85	2N4363	.85
7429	.70	74151	.30	74LS228	.80	AD161/62	5.0	MPF108	1.15	2N4364	.85
7430	.48	74153	1.95	74LS230	.55	AD162	1.60	MPF109	1.15	2N4365	.85
7432	.86	74154	.30	74LS232	.70	AT1138	2N2001	MPF603	1.60	2N4366	.85
7437	.86	74157	.30	74LS237	.70	ASV17	2.65	MPF103	1.20	2N4367	.85
7438	.86	74158	.30	74LS238	.70	BC107	3.5	MPF104	1.30	2N4368	.85
7440	.48	74164	2.90	74LS240	.30	BC108	3.5	TP120	3.20	2N4369	.85
7441	2.80	74165	2.90	74LS242	2.20	BC109	3.5	TP125	3.20	BA102	21.00
7442	.86	74166	2.90	74LS243	2.20	BC117	.70	OA43	1.70	OA43	1.70
7445	2.80	74180	2.90	74LS244	2.20	BC178	.80	TP225S	1.70	OA90	1.50
7446	.86	74181	2.90	74LS245	2.20	BC179	.40	TP235S	1.70	OA81	.35
7447	.86	74182	2.90	74LS246	2.20	BC182	.40	TP240	1.70	5062-2800	3.20
7448	2.80	74190	2.90	74LS247	2.20	BC215	.50	TP245	1.70	5062-2800	3.20
7450	.48	74177	2.90	74LS248	1.95	BC327	.55	2N1969	.40	40S37A	2.85
7451	.48	74191	2.90	74LS249	1.95	BC337	.55	2N1970	1.20	40G73	1.95
7452	.48	74192	2.90	74LS250	1.95	BC347	.55	2N1971	1.20	40G74	1.95
7454	.48	74193	2.90	74LS251	1.95	BC348	.55	2N1972	1.20	40G75	1.95
7450	.48	74194	2.90	74LS252	1.95	BC349	.55	2N1973	1.20	40H41	1.95
7451	.48	74195	2.90	74LS253	1.95	BC349C	.55	2N1974	1.20	BZ161	1.50
7452	.48	74196	2.90	74LS254	1.95	BC350	.55	2N1975	1.20	BZ179	1.50
7453	.48	74197	2.90	74LS255	1.95	BC351	.55	2N1976	1.20	BZ180	1.50
7454	.48	74198	2.90	74LS256	1.95	BC352	.55	2N1977	1.20	BZ181	1.50
7455	.48	74199	2.90	74LS257	1.95	BC353	.55	2N1978	1.20	BZ182	1.50
7456	.48	74200	2.90	74LS258	1.95	BC354	.55	2N1979	1.20	BZ183	1.50
7457	.48	74201	2.90	74LS259	1.95	BC355	.55	2N1980	1.20	BZ184	1.50
7458	.48	74202	2.90	74LS260	1.95	BC356	.55	2N1981	1.20	BZ185	1.50
7459	.48	74203	2.90	74LS261	1.95	BC357	.55	2N1982	1.20	BZ186	1.50
7460	.48	74204	2.90	74LS262	1.95	BC358	.55	2N1983	1.20	BZ187	1.50
7461	.48	74205	2.90	74LS263	1.95	BC359	.55	2N1984	1.20	BZ188	1.50
7462	.48	74206	2.90	74LS264	1.95	BC360	.55	2N1985	1.20	BZ189	1.50
7463	.48	74207	2.90	74LS265	1.95	BC361	.55	2N1986	1.20	BZ190	1.50
7464	.48	74208	2.90	74LS266	1.95	BC362	.55	2N1987	1.20	BZ191	1.50
7465	.48	74209	2.90	74LS267	1.95	BC363	.55	2N1988	1.20	BZ192	1.50
7466	.48	74210	2.90	74LS268	1.95	BC364	.55	2N1989	1.20	BZ193	1.50
7467	.48	74211	2.90	74LS269	1.95	BC365	.55	2N1990	1.20	BZ194	1.50
7468	.48	74212	2.90	74LS270	1.95	BC366	.55	2N1991	1.20	BZ195	1.50
7469	.48	74213	2.90	74LS271	1.95	BC367	.55	2N1992	1.20	BZ196	1.50
7470	.48	74214	2.90	74LS272	1.95	BC368	.55	2N1993	1.20	BZ197	1.50
7471	.48	74215	2.90	74LS273	1.95	BC369	.55	2N1994	1.20	BZ198	1.50
7472	.48	74216	2.90	74LS274	1.95	BC370	.55	2N1995	1.20	BZ199	1.50
7473	.48	74217	2.90	74LS275	1.95	BC371	.55	2N1996	1.20	BZ200	1.50
7474	.48	74218	2.90	74LS276	1.95	BC372	.55	2N1997	1.20	BZ201	1.50
7475	.48	74219	2.90	74LS277	1.95	BC373	.55	2N1998	1.20	BZ202	1.50
7476	.48	74220	2.90	74LS278	1.95	BC374	.55	2N1999	1.20	BZ203	1.50
7477	.48	74221	2.90	74LS279	1.95	BC375	.55	2N2000	1.20	BZ204	1.50
7478	.48	74222	2.90	74LS280	1.95	BC376	.55	2N2001	1.20	BZ205	1.50
7479	.48	74223	2.90	74LS281	1.95	BC377	.55	2N2002	1.20	BZ206	1.50
7480	.48	74224	2.90	74LS282	1.95	BC378	.55	2N2003	1.20	BZ207	1.50
7481	.48	74225	2.90	74LS283	1.95	BC379	.55	2N2004	1.20	BZ208	1.50
7482	.48	74226	2.90	74LS284	1.95	BC380	.55	2N2005	1.20	BZ209	1.50
7483	.48	74227	2.90	74LS285	1.95	BC381	.55	2N2006	1.20	BZ210	1.50
7484	.48	74228	2.90	74LS286	1.95	BC382	.55	2N2007	1.20	BZ211	1.50
7485	.48	74229	2.90	74LS287	1.95	BC383	.55	2N2008	1.20	BZ212	1.50
7486	.48	74230	2.90	74LS288	1.95	BC384	.55	2N2009	1.20	BZ213	1.50
7487	.48	74231	2.90	74LS289	1.95	BC385	.55	2N2010	1.20	BZ214	1.50
7488	.48	74232	2.90	74LS290	1.95	BC386	.55	2N2011	1.20	BZ215	1.50
7489	.48	74233	2.90	74LS291	1.95	BC387	.55	2N2012	1.20	BZ216	1.50
7490	.48	74234	2.90	74LS292	1.95	BC388	.55	2N2013	1.20	BZ217	1.50
7491	.48	74235	2.90	74LS293	1.95	BC389	.55	2N2014	1.20	BZ218	1.50
7492	.48	74236	2.90	74LS294	1.95	BC390	.55	2N2015	1.20	BZ219	1.50
7493	.48	74237	2.90	74LS295	1.95	BC391	.55	2N2016	1.20	BZ220	1.50
7494	.48	74238	2.90	74LS296	1.95	BC392	.55	2N2017	1.20	BZ221	1.50
7495	.48	74239	2.90	74LS297	1.95	BC393	.55	2N2018	1.20	BZ222	1.50
7496	.48	74240	2.90	74LS298	1.95	BC394	.55	2N2019	1.20	BZ223	1.50
7497	.48	74241	2.90	74LS299	1.95	BC395	.55	2N2020	1.20	BZ224	1.50
7498	.48	74242	2.90	74LS300	1.95	BC396	.55	2N2021	1.20	BZ225	1.50
7499	.48	74243	2.90	74LS301	1.95	BC397	.55	2N2022	1.20	BZ226	1.50
7500	.48	74244	2.90	74LS302	1.95	BC398	.55	2N2023	1.20	BZ227	1.50
7501	.48	74245	2.90	74LS303	1.95	BC399	.55	2N2024	1.20	BZ228	1.50
7502	.48	74246	2.90	74LS304	1.95	BC400	.55	2N2025	1.20	BZ229	1.50
7503	.48	74247	2.90	74LS305	1.95	BC401	.55	2N2026	1.20	BZ230	1.50
7504	.48	74248	2.90	74LS306	1.95	BC402	.55	2N2027	1.20	BZ231	1.50
7505	.48	74249	2.90	74LS307	1.95	BC403	.55	2N2028	1.20	BZ232	1.50
7506	.48	74250	2.90	74LS308	1.95	BC404	.55	2N2029	1.20	BZ233	1.50
7507	.48	74251	2.90	74LS309	1.95	BC405	.55	2N2030	1.20	BZ234	1.50
7508	.48	74252	2.90	74LS310	1.95	BC406	.55	2N2031	1.20	BZ235	1.50
7509	.48	74253	2.90	74LS311	1.95	BC407	.55	2N2032	1.20	BZ236	1.50
7510	.48	74254	2.90	74LS312	1.95	BC408	.55	2N2033	1.20	BZ237	1.50
7511	.48	74255	2.90	74LS313	1.95	BC409	.55	2N2034	1.20	BZ238	1.50
7512	.48	74256	2.90	74LS314	1.95	BC410	.55	2N2035	1.20	BZ239	1.50
7513	.48	74257	2.90	74LS315	1.95	BC411	.55	2N2036	1.20	BZ240	1.50
7514	.48	74258	2.90	74LS316	1.95	BC412	.55	2N2037	1.20	BZ241	1.50
7515	.48	74259	2.90	74LS317	1.95	BC413	.55	2N2038	1.20	BZ242	1.50
7516	.48	74260	2.90	74LS318	1.95	BC414	.55	2N2039	1.20	BZ243	1.50
7517	.48	74261	2.90	74LS319	1.95	BC415	.55	2N2040	1.20	BZ244	1.50
7518	.48	74262	2.90	74LS320	1.95	BC416	.55	2N2041	1.20	BZ245	1.50
7519	.48	74263	2.90	74LS321	1.95	BC417	.55	2N2042	1.20	BZ246	1.50
7520	.48	74264	2.90	74LS322	1.95	BC418	.55	2N2043	1.20	BZ247	1.50
7521	.48	74265	2.90	74LS323	1.95	BC419	.55	2N2044	1.20	BZ248	1.50
7522	.48	74266	2.90	74LS324	1.95	BC420	.55	2N2045	1.20	BZ249	1.50
7523	.48	74267	2.90	74LS325	1.95	BC421	.55				

INTRUDER WATCH

Alf Chandler, VK3LC

1536 High Street, Glen Iris, 3146

As I haven't got much of interest IW wise this month, I thought that some comments on recent Observer's reports may be useful. Lately the Voice of America, Philippines has been heard on 14100 kHz with two programs superimposed.

It has been ascertained that the programs are Russian language and those transmitted on 11865 and on 9630 kHz. A little fundamental mathematics—twice 11865 equals 23730 minus 9630 equals 14100. Thus, it appears that the second harmonic of 11865 is beating with the fundamental of 9630 producing the spurious transmission. VOA has been alerted and they say—"We are doing major maintenance work and the fault will be attended to in due course".

Another VOA program has been reported on 14175 kHz, but so far we have not got to the cause. We think that the program on 11840 kHz is beating with another as yet unknown frequency. Further reports would be appreciated.

A broadcast on 3537 kHz which has been reported here as 3535, and the word 'Fukien' decyphered is—"Fukien Front, People's Liberation Army". 3549.5 reported here as 3550 kHz, we think is still Ambon, Indonesia, but we need further confirmation. In the USA "FCC has sent out telegrams recently on about ten of my complaints". This from K6KA.

If you care to listen on 14180 kHz at about 0600-0630 UT you will hear a carrier, and if you listen intently enough you will be able to compare the program with that on 7090 kHz, Radio Tirana. The second harmonic on 14180, and from America is said "Yes, Tirana is famous for harmonics, but also so are their 'emmers'". NAP heard on 14024 kHz is Red Chinese despite the call-sign, and K6KA says "I had better remind FCC about my summaries alert on NAP. I alerted 14024 not so long ago." He also says "It's odd you don't get BAA6/7/8/20/22/24 with RY's at 0001 Z daily on 14340 kHz". Would somebody with RTTY facilities give me a read-out on this one. ■

LARA

Ladies Amateur Radio Association

This month will see some LARA members sitting for the Novice exam, so to start off, we wish these people the very best of luck.

Since more Novices will appear on air soon there has been some discussion within LARA as to how Novice activity can be encouraged. It has been suggested that the LARA sked which is currently held on 3650 MHz (on Monday nights at 8.00 p.m. Eastern Time) should move down to 3.558 kHz which is within the Novice band. Some operators already have crystals on this frequency and if the LARA sked were moved, then new YL operators could be

encouraged to buy these crystals and join in. Most current members of the net could change to this frequency with little trouble, so the idea looks promising. This will be brought up and discussed further in the Newsletter and members' opinions and/or objections are welcomed.

Just a general word about the LARA sked. This is a LARA net linking YL operators all over Australia for a regular chat and also the sked allows YL newcomers to try their hands at operating, overcoming "mike-shyness" and coming up to say "hello". To make the net-controller's job easier, it has been agreed that the first half-hour of each sked be reserved for YL operators and YL guests from other stations. After this first segment, the gentlemen are free to join in should they wish.

LARA VK3 NEWS

This month, the LARA meeting will be combined with a car rally. The meeting will be held on Sunday, 22nd May, at the home of Jean Troubridge, in North Melbourne, starting at 11.00 a.m. Further details can be obtained, as the date gets closer, by contacting Jean on 329 8506. Also in VK3, some LARA members have been representing the club at one of our favourite sports—fox hunting. A LARA team has joined in VHF group fox hunts with moderate success and a great deal of fun.

Once again, best wishes to exam candidates.

33 LARA ■

20 YEARS AGO

Ron Fisher, VK3OM

MAY 1957

Amateur Radio for May 1957 included the start of a series of articles that still continues to be a standard reference. Gordon Brown VK5XU "Modifying the AR7 Receiver" has probably been copied and read by more people than almost any other single series published in AR. Part one contained a general description and the Alignment procedure.

A second article by Gordon, "Adding AVC and Audio Volume Control to the Type 3 Mark II" was also a very popular one at the time. Two different "spy" type transceivers were popular for portable operation at the time, the Type A Mark III and the larger Type 3 Mark II. The A Mark I covered 40 and 80 with a 7C5 in the final while the type 3 covered 80, 40 and 20, used a 6L8 in the final and ran about 30 watts input on CW. Naturally they were adapted for AM phone operation and were extensively used for both portable and home station operation.

Indeed May was a real "surplus" issue with an AT5 transmitter conversion article by Don Haberecht VK2RS. The old AT5 worked well enough on 80 and 40 but 20 metre operation required doubling in the final and 15 and 10 were not covered at all. Don's article showed how to remedy all of these problems.

Technical articles were rounded out with "A Simple Capacity Bridge for the Blind" reprinted from the New Zealand

Break In magazine, plus quite a bit of data on some of the newer tubes.

The predecessor of the present LARA column, YL Corner, was conducted by Phyl Moncur, wife of Len VK3LN. Phyl wrote mainly about the trials and tribulations of the XYL of an enthusiastic amateur. ■

IARU NEWS

NEW PREFIXES

From the January 1977 issue of the IARU Region 1 News the following is a list of recently issued prefixes—

D7A-D9Z — Rep. of Korea.
S7A-S7Z — Rep. of Seychelles.
S8A-S8Z — Transkei.

NEW ITU MEMBERS

From the same source the following new ITU member countries were listed—
Surinam — Republic.
Sao Tome and Principe — Democ. Rep.
Cape Verde — Rep.
Angola — Peoples' Rep.

KUWAIT LICENSING

"Readers will recall that OM Collin 9M2CR recently spent 6 months in Kuwait working for ITU. It took all that time—and more—to get formalities completed for his 9K2 ticket—allotted the call sign 9K2ET. No chance of getting 9K2CR since this was already issued to the D-G of Telecoms himself; though it was never used by that gentleman. No real problems in getting a ticket for anyone able to produce his current licence from a reputable administration such as Malaysia." 9M2CR writing in the MARTS newsletter No. 6. ■

MAGAZINE

INDEX

Syd Clark, VK3ASC

CQ September 1976

DXpedition to Tonga and Niue Islands; How to Make a Contest More Fun; An Improved Antenna Noise Bridge, A Push-Button to Dial Telephone Converter; Antennas; Simple Antenna Ideas; Novice's Effects of FCC Rules Changes, QRP, Major RF Loop Consideration, Pt. V: The Tempo MR-2 Monitor Receiver (Review); Modern Surplus Equipment for 10 and 6 Metres; Put a Touch-Tone Pad Into Your HT.

CQ January 1977

Slow Scan Television, Overview '77; Announcing the 20th Annual CQ World Wide WPX/SSB Contest; Waveguides, Pt. 2; Conversion of Decimal and Seven Segment Signals Back into BCD, Sending and Receiving QSL Cards; The Yaesu YG-1355D Frequency Counter (Review); Signal/One Transceiver Improvements, A Voltage-to-Frequency Converter IC with Amateur Applications; Making IC Projects Work; Improving CW Selectivity in the Argonaut; The G3NGD Semi-Vertical Antenna; In Focus 1977—A Look Ahead

CQ February 1977

A DXpedition to Trinidad Island; The Kenwood TS-820 Transceiver (Review); The

Hy-Gain's Incomparable HY-TOWER

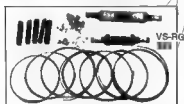
for 80 thru 10 Meters
Model 18HT

- Outstanding Omni-Directional Performance
- Automatic Band Switching
- Installs on 4 sq. ft. of real estate
- Completely Self-Supporting

By any standard of measurement, the Hy-Tower is unquestionably the finest multi-band vertical antenna system on the market today. Virtually indestructible, the Model 18HT features automatic band selection of 80 thru 10 meters through the use of a unique stub decoupling system which effectively isolates various sections of the antenna so that an electrical $\frac{1}{4}$ wavelength (or odd multiple of a $\frac{1}{4}$ wavelength) exists on all bands. Fed with 52 ohm coax, it takes maximum legal power ... delivers outstanding performance on all bands. With the addition of a base loading coil, it also delivers outstanding performance on 160 meters. Structurally, the Model 18HT is built to last a lifetime. Rugged hot-dipped galvanized 24 ft. tower requires no guyed supports. Top mast, which extends to a height of 50 ft., is 6061 ST6 tapered aluminum. All hardware is Inlids treated to MIL specs. If you're looking for the epitome in vertical antenna systems, you'll want Hy-Tower Shpg. Wt., 96.7 lbs.

sale

\$298.00



\$102

The Versatile Model 18V for 80 thru 10 Meters

NEW ...

Special hinged base assembly on Model 18HT allows complete assembly of antenna at ground level ... permits easy raising and lowering of the antenna.

The Model 18V is a low-cost, highly efficient vertical antenna that can be tuned to any band ... 80 thru 10 meters ... by a simple adjustment of the feed point on the matching base inductor. Fed with 52 ohm coax, this 18 ft. radiator is amazingly efficient for DX or local contact. Constructed of heavy gauge aluminum tubing, the Model 18V

HIDAKA'S VS-41/80KR

for 10 thru 80 Meters

- An Individually Tuned High-Q Trap for Each Band
- Takes Full Power
- Rugged Total Performance Construction
- Easily Installed Using Minimum Space

Now ... a modestly priced easily erected all-band vertical that delivers outstanding omni-directional performance on each band HIDAKA'S Model VS-41/80KR. It is ruggedly constructed of heavy gauge, taper-swaged aluminum ... uses four separately tuned High-Q air dielectric traps ... each trap factory tuned to provide maximum performance 80 through 10 meters. Uncompromised performance for short haul or DX communication is ensured by the low angle radiation pattern developed by the VS-41/80KR. SWR is 2:1 or less on all bands. If mounted in an elevated position a radial wire system should be used. An accessory TRAPPED radial wire kit is available, the Model VS-RG. The VS-41/80KR comes complete with Terelyne guying cord.

TECHNICAL DATA

Power Rating	1 kw AM, 2 kw SSB
Feed Line Required	50-70 ohm coax
Minimum Ground Required	8ft. Ground Rods
Overall Height	28.4 ft.

may be installed on a short 1 1/2 inch mast driven into the ground. It is also adaptable to roof or tower mounting. Highly portable, the Model 18V can be quickly knocked down to an overall length of 5 ft. and easily re-assembled for field days and camping trips. Shpg. Wt., 5 lbs

\$49

Also available from BAILS —

VS-2GH 2 metre $\frac{1}{4}$ wave G.P.	\$35.00
VS-6GH 6 metre $\frac{1}{4}$ wave G.P.	\$37.00
ARX-2 three half wave 6dB gamma loop matched vertical	\$49.00
ARX-450 435-450 MHz three half wave 6dB Ringo	\$45.00

Prices include S.T. Allow 50c per \$100 insurance, min. 50c.

Prices and specifications subject to change. Freight extra.



**ELECTRONIC
SERVICES**

88 Sherman St., Box 111 North, Vic., 3126. Phone 80 2213
Distributors in all states and N.T.

FRED BAIL VK3Y9
JIM BAIL VK3ABA

Multi-Band Trap Antenna, Pt. 1; Report on NSV's SSTV Pics. from Mars; The Gross CW-25 Transmitter; Understanding Coaxial Cable; Single Sideband Theory for People Who Don't Understand Single Sideband Theory; On a Clear Day You Can CFAR Ever; The Powerfarm, A Log-Periodic Quad Array; A Synthesiser for the HT-220; Peak Envelope Power; Slow Scan Television, Overview '77, Pt. 2.

QST January 1977

Understanding Linear IC's; A Dual-Gate MOSFET Dip Meter; The DVM/Frequency Counter Becomes a Clock; A Gated Noise Source; A Prototype Pulse-Code Modulation System; The Microprocessor and Repeater Control; Reviews, Heathkit HR-1680 Receiver; Heathkit HS-1661 Speaker; Palomar Engineers R-X Noise Bridge; Heath HW-2021; The Barlow-Wadley XCR-30 Re-

ceiver; Kronotek RF-Actuated Timer RT-1; National Semiconductor SC/MP Microprocessor; A New Look Noise Blanker That Works; A Hybrid 20 Metre Quad; Speak Up We Can't Hear You; Getting to Know OSCAR from the Ground Up; We've Only Just Begun; The Canadian Winter Rally; Chart Your Way to Better DX; Your SCM and How He Is Elected.

RADIO ZS December 1976

A December Night's Thoughts; Shoot for the Horizon, Pt. 1; Marconi of the South African Police.

73 December 1976

Go Tone for Ten; World's Simplest Five Band Receiver; How Do You Use IC's?; Hamming 101; A Super Cheapo Ider; The ZF Spacing Antenna; CT7001 Clockbuster; Saving a CBER; A Ham's Computer; What's All This LSI Bunk?; The Soft Art of Pro-

gramming, Pt. 3; New Improved Monitor; Put Snap in Your SSTV Pictures; What's All This Wire-Wrap Stuff?; Exploding the Power Myth; Exploding the SWR Myth; Bring a Dead Band to Life; The IC22 Walkie; The Latest in Counters; The Five Minute COR; See the World and Get Paid; Watch DX With a Spectrum Analyser; DXing with a Weather Map.

HAM RADIO December 1976

High-Frequency Communications Receiver; Low-Frequency Loop Antennas; QRP 7 MHz CW Transmitter; Broadband Amplifier Uses MOSPower FET; Electronic Meter Amplifier; ASCII-to-Morse Code Translator; Ladder Network Analysis; Resurrecting Old Receivers; Increased Flexibility for MFJ CW Filters; Signal to Noise Performance of Low-Frequency-Shift RTTY; Microcomputer Interrupts.

IONOSPHERIC PREDICTIONS

Len Poynter, VK3ZGP/NAC

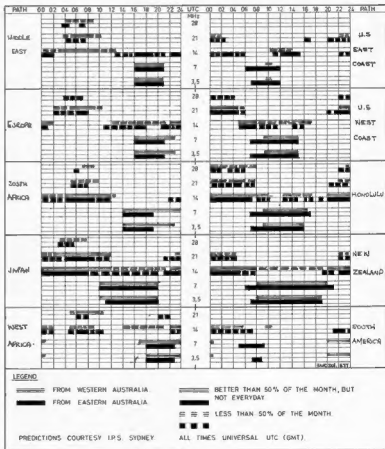
Charts for April and May begin to show the influence of the new cycle activity. Whilst there is no great upsurge in the sunspot count, there is a significant increase in ionospheric quality. The 2800 MHz solar flux measurements are showing up this increase with monthly means around 75 whereas last year they were in the high 60's. In turn these produce changes in the formula for computing path openings.

10 metres is showing many awakening signals—not just to the occasional users but the solid adherents who are finding increasing path openings. 15 metres is also showing plenty of activity with plenty of DX being worked. 20 metres is well and truly alive along with 40, 80 and 160 metres.

There have been significant increases in signals across most paths in recent months, particularly those lying close to and indeed over the polar regions showing more reliability. These are encouraging signs as a decrease in polar cap absorption will open up paths that have been dormant for quite a while.

The Dec.-Jan. reports from Zurich indicate a rise in the running smoothed number becoming more apparent as 1977 draws on. It is still too early to say when the low mathematically occurred, perhaps by late 1977 it will have become apparent. However there is still life in the old cycle spots and the newer ones are well up in activity when they occur.

With the next maxima predicted for around 1982 with a number around 50 (like 1974) will force many to look closely at antennas if they seriously wish to work DX. It will be many decades before we see conditions anything like the two previous maxima. However those who know the signs and use them to their advantage will be working more than the average share of DX.



With WARC 79 and the prospect of some additional bands I have recently had a look at some forward predictions. Two interesting prospects are 18 and 24 MHz and 10 MHz looks also very promising. Whatever the outcome will be, it's desirable that whatever we have now should be well used.

In closing I wish to add a word of

thanks to Bert VK3GS who had assisted me over many months with his sunspot observations from his well equipped observatory. His untimely addition to the Silent Keys has left me without an eye on the sun. I certainly will miss his excited calls to tell me of news of sunspots.

VK3ZGP/NAC

HAMADS

- Eight lines free to all WIA members. \$9 per 3 cm for non-members.
- Copy in typescript please or in block letters to P.O. Box 150, Toorak, Vic. 3142.
- Commercial advertising is excluded.
- Closing date: 1st day of the month preceding publication. Cancellations received after about 12th of the month cannot be processed.
- QTH means the advertiser's name and address are correct in the current WIA Radio Amateurs Call Book.

FOR SALE

VHF Specials, tubes, new, unused, OQVOS-20 \$20 ea.; QOVOS-40 \$30; 2E25 \$10; Nuvistors BCW4 \$10 ea.; 7587 \$12 ea.; Nuvistor bases \$2 ea.; QOV bases \$5 ea.; general radio frequency meter, 7250 10 to 200 MHz, \$85. VJ26FJ, 90 Wyoong Road, Killarney Vale, N.S.W. 2261. Ph. (043) 52 5758.

AWA-RM10, low band un-mod., cables, transistor P.S., handset and cradle, VGC, \$20; Pse. Victor, low band un-mod., VGC, less mic. insert, \$19; AWA-RM10, 100 W, 1 channel switch, no sta. VGC, \$30. VK3KEM, QTHR. Ph. (03) 59 7745.

VGC 12, 120W output, 80 thru 10m, uses two 6146 final amplifier tubes, Hallicrafters model HT-37, 240V AC operation, \$250. James VK3JO. Ph. (02) 56 2915.

Moving overseas, must sell FT101E, IC22A with channels 40, 50, R42 and R48. Both in A1 condition with original cartons, also Heathkit HW101 less power supply, in working condition. T. Dobler, Box 883, Mackay 4742.

National Panasonic 3 band, 2 speaker, 14 transistor Rx, as new. Tunes 530-1600 kHz, 2-3.7 MHz, 7-22 MHz, \$40; MFJ SSB filter, GBF-2, as new, \$25; Philips Black and White TV, 21 inch, on legs, in excellent order. VK3LJ, QTHR. Ph. (03) 509 2566.

Europa 144 MHz transverter to 28 MHz, 200 watts p.e.p. and excellent reception. Plugs into most VHF transceivers or split frequencies, broad new, \$220, two only. VK3DS, QTHR.

Heath HW32 20 mhz, 300 watt transceiver with H.D. power supply (H.B.) and manual. This is a first class performer, home or mobile, and it's light, \$200. VK3DS, QTHR.

IC21A FM Transceiver, base/mobile station, 10 pairs crystals, AC/DC, excel. cond., little use, \$200; Renger ARX2 2m antenna, \$25; Y-gain 2m 5/8 whip with magnetic base, excel. performer, good cond., \$25. VK3LJ, QTHR. Ph. (053) 32 3412.

Yaesu FT 101B Transceiver, 10 to 160m, WWV, SSB, AM, CW. In first class condition, very little use \$300/40 AC or 12V DC supply, additional kit located position and input speaker, self contained 1 1/2" x 6" x 1 1/4", suitable for stationary or mobile use, \$395. VK2AKS, P.O. Box 954, Parramatta. Ph. (02) 635 1320.

Commercial radio mast, four 12 ft. sections, top fitting for 12 ft. 2 in. pipe, self supporting, hot dip galv., heavy construction, excellent condition, \$400. VK2AKS, P.O. Box 954, Parramatta. Ph. (02) 635 1320.

Modern quiet 16 sq. brick country home, with 23 ac., excellent DX position for HF, VHF, UHF, beautifully located Upper Hawkesbury area, 1000 ft. el., unrestricted view Blue Mountains, 3 br., central heating, al.electric, good double garage and shedding, heavy 60 ft. tower, radial earthing system, 24V ac. diesel unit, 42 air miles from Banksia, air strip with hangar available, delightful bush walks, unspoiled native flora and fauna, perfect place to get away from it all, yet only an hour's drive Hornsby, \$71,000. VK2AAK, P.O. Box 954, Parramatta. Ph. (02) 635 1320.

Collins KWN2 Transceiver, purchased new, no mods., excellent DX unit, \$1200; PM2 Collins portable power supply, \$180; 31255 Collins external VFO, transmitter, phone patch, speaker and control unit, \$350; 507T Collins collinear, stainless steel portable multi dipole, all frequencies, offers; 20A AWA, clean, \$30; 20B AWA 12V FM unit, clean, \$35. VK2AAK, P.O. Box 954, Parramatta. Ph. (02) 635 1320.

GDO and Megacycle Meter, 420-940 mc. by Measurements Ltd., with power supply, \$120; steel cable, 3/8", 254m, new, \$115; Dexion 200 ft. heavy duty, \$100; cutter, \$30, all new. VK2AAK, P.O. Box 954, Parramatta 2150. Ph. (02) 635 1320.

PAI TV Pattern Generator, Philips PM509, \$750 or offer. VK3HJ, QTHR.

ICOM IC22A 2m FM 10W, mobile with mounting bracket, includes Ch. 2, 4, 40 and 50, perfect condition for sale. VK3AQL, QTHR. Ph. (03) 277 5623.

QTH for Sale, 70 ft. ex DCA tower (self supporting) with TH6 6 el. tribander and Ham II Rotator and control, plus B/T Home, 2 double br., lounge and spec. dining room, large alf in kitchen, bathroom, laundry, 1 1/2 garage, fully fitted, 14 ft. x 20 pool, plus 10 ft. square "Black" amongst trees in garden, located opposite park, 5 min. walk to station and shops, \$38,000. VK2DD, QTHR. Ph. (02) 546 6385.

ICOM IC282, as new condition, bought Feb. 1977. Unmodified, covers 144.0 to 144.8 MHz, 3W PEP, Japanese manual, all connectors, gel-filled married and, unfortunately, I need the box. Price \$130, negotiable. Doug Rosser VK2ZEX. Ph. (02) 633 2199 bus.

Muilt 2000 2m fully synthesized SSB-FM CW transceiver, little used, excel. condition, \$400. Yaesu FT2PB mobile 2m FM rig, Ch. 40, 50, R2, 3, 4, 5 and 8, with direct 4 & 8, \$150. Lafayette HA8006 amateur bands Rx 80 thru 8m, \$150. All in original packing and complete with instruction books and accessories. VK2AOE, QTHR. Ph. (02) 69 5099 bus, (02) 449 6354 AH.

DX108 Communications Rx, exc. cond., \$150, s'no two Midland twin meter SWR bridges, exc. cond., \$25 ea., s'no 13.5V 5A powered supply, solid construction, \$50. Ph. Bert (03) 42 5312 bus, (03) 758 4086 AH.

Uniden 2020 transceiver, complete with external speaker in first rate condition, \$700. Bob Cunningham VK3ML. Ph. (03) 20 7780 QTHR.

Modulation Transformer Thorodora 60W mounted in a home-brew BC Rx complete with HT power supply, \$40 OHO. Contact John 520, Contact John 520, call collector with ill yoke \$20. Contact John 520, VK3ZVZ, 12 Great Valley Rd., Glen Rize, Vic. 3149. Ph. (02) 25 4953 AH.

One little Dick Power Supply, 12V, 3 amp., \$20.00. Good cond. VK3TG. QTHR. Ph. (058) 52 1636.

Hustler Whips, 80, 40 and 20m, complete with M02 mast, bumper mount, base mount, new, never used, \$110. Yaesu speaker, matches 101, 101, 101, new condition, \$35. Yaesu VO-244 microphone, new cond., \$30. C. P. Singleton VK4UX, 45 Edward St., Dalby. C. 4405.

FT101 Mark 2 transceiver (same as 101B), exc. cond., little used, complete with original packing box, instruction book, mic. etc., no mods, \$325 OHO. As DC75 power supply G/W mod's/mo for FT75, used once, \$40 OHO. VK4XT. Ph. (074) 82 2389 or write PO Box 498, Dalby, 4405.

WANTED

Transistor communications HF Rx, Barlow Wadley or similar. Jim VK4OK, QTHR. Ph. Barlow 21R.

Constructional details for AC transmitters with secondary winding, 24V up to 750W rating. Please write to S. A. Felt, 14 Wade Street, Lismore 2480.

AF46 210X transceiver or any small HF transceiver like Swan monobanders etc. for mobile use. VK4XT. Ph. (074) 62 2389 or write PO Box 498, Dalby, 4405.

Information on ARR/ATS, particularly on modification and improvement for a new Amateur wanting so-called line experience. Ph. (02) 47 1973. 49 Kinsla St., Reservoir, 3073.

HF Transceiver, second-hand, preferably Yaesu FT101, FT200, FT400, s'no Ken KP202 2m hand-held and 4CX250B v.tubes, chimneys and parts to suit VHF Unimars. Any reasonable condition. Graeme VK7ZAG. Ph. (094) 27 6982 (mornings).

Pai Selys Motors. Particulars to VK45D, QTHR.

RENTAL

VK3AOG will be in Cairns June-Sept. approx. The home QTH on Murray at Barnham is available for modest rental. Tower with TH3 and 2MT beams, home brew linear. Home is new, Color TV, dishwasher, etc. Ph. Tom Savers (058) 69 3263.

SILENT KEYS

It is with deep regret that we record the passing of —

Mr. A. JACOBSEN VE7CGF
(formerly VK8WB and ZL3WB)
Mr. A. J. E. FORSYTH, O.B.E. 6FO
(Proprietor of Short Wave Magazine)
Mr. R. W. WILKINSON VK3AKC
Mr. A. S. LITTLE VK5AF
Mr. J. W. LADE LA0578

RON WILKINSON VK3AKC
The amateur fraternity was saddened to hear the news of the death of Ron Wilkinson VK3AKC, of Geelong, on Tuesday, 22/3/1977. Darrell VK3AQR was kind enough to phone me on the Wednesday with the news, and I appreciate his promptness in letting me know, as word could be passed to Ron's many friends.

Ron was always noted for his cheery greetings on the air and giving his location as Geelong-100, something we all appreciated.

His dedication to the art of VHF and UHF was recognised universally, and his many years of activity included operation on all bands from 160 metres to 1296 MHz, and currently with such modes as SSB, CW, FM and ATV. His activities on 1296 MHz EME operation are legend, and his pioneering efforts in this direction have surely been an inspiration to others, helped by his ready willingness to share his knowledge with anyone showing interest.

His absence from the bands will be particularly noticed in Victoria and Tasmania because he could always be counted upon to come on or be on the air at times when it mattered, providing the other end of contacts across the water for test purposes with other amateurs, and at the band openings on 144 and 432 MHz etc.

Over the 12 years I have known Ron and Mary, his wife, I always felt at ease in their company, and as recent as last July my wife and I were guests of Ron and Mary at their home, and have many pleasant memories of an enjoyable evening.

Time will heal the wound caused by Ron's passing, but I am sure Ron will be long remembered for his many achievements, as an amateur, for efficiency with his work, which was a pleasure to behold, as a citizen, and as a gentleman. We will proudly remember him.

Eric Jamieson VK5LP

ALBERT SCOTT LITTLE VK5AF

Scott passed away on 12th February following about two years of ill-health. Active as VK5AF since 1948, but with pre-war and post-war amateur interest, he operated mainly DX bands, with almost exclusive mobile facilities over the last few years. He served in the RAAF as a pilot during World War 2 and following successful academic Radiocommunications studies, was employed as a Radiophysicist on the 1953/4 Antarctic Expedition to Macquarie Island, where he operated as VK1AF.

He was awarded the I.R.E. "Flak" prize for the most successful student in 1952.

Professionally he was employed as the District Supervisor for the Electricity Trust of South Australia, at Strathalbyn, where his Electrical, Civil and Radio Engineering backgrounds were combined in an intense study of the problems of RFI from High Voltage Power lines. His assistance with the local Emergency Fire Service radio system extended over many years.

Scott was frequently engaged in a variety of amateur experiments, often in collaboration with his life-long friend, Bob Edgar VK5RE, and his brother-in-law, Bob Gurr, VK5RG.

The sympathy and friendship of all Amateurs is extended to his wife Marion and their four daughters.

Rob Gurr VK5RG

LOOK INTO THE ULTIMATE



VOX: Voice - activated mks circuit is built into the TS820. All vox controls up front.

NOISE BLANKER: Crystal filter circuit is highly efficient in eliminating pulse noises.

RF MONITOR: lets you hear your own transmission. Also useful for adjusting RF processor

IF SHIFT: (Pass-band tuning) varies IF passband without changing receive frequency-lets you eliminate unwanted signals. RIT lets you vary receive frequency 5k Hz either side of VFO.

VERNIER: Plate tuning control has vernier for fast precise tune-up adjustment.

HEATER: lets you turn off tube filaments on receive only. TS820's solid state circuit draws less than most car dash lights.

DIGITAL READ-OUT. (Optional) Clear blue readout on receive and transmit. Mixes carrier, VFO and 1st het frequencies.

THE BREATHTAKING KENWOOD TS-820 PACESETTER HF TRANSCEIVER

You command the band with our Kenwood TS820. Superb phase lock loop circuitry allows highly accurate frequency derivation without introducing spurious signals. You can switch sidebands (USB, LSB, CW) without recalibrating, too!

Kenwood's exclusive FET-based VFO gives high stability under all conditions. If you'd like to know more, just mail the coupon today.

WHEN YOU WANT TO MOVE UP:



TV506: 6MTR band transverter



SP-520: 80hm external speaker



VFO2: Remote VFO 5.0 - 5.5 MHz



TV502: 2MTR band transverter

Contact your nearest Kenwood dealer or Weston Electronics direct



KENWOOD

MARKETED IN AUSTRALIA BY WESTON ELECTRONICS COMPANY, FOR TRIO KENWOOD CORPORATION, JAPAN. HEAD OFFICE: 2 THE CRESCENT, KINGSGROVE, N.S.W. 2208.

COUPON

CALL SIGN

NAME

ADDRESS

Postcode
Phone

WECAR1

BYTE

THE SMALL SYSTEM JOURNAL



THE MAGAZINE FOR THE COMPUTER PROFESSIONAL AND HOBBYIST,

Some articles previously featured in 'BYTE', include,

What's in a video display, Read Only Memory Technology, Machine language programming for the 8008, Build a fast cassette interface, Build a mathematical function unit, Build a graphics interface, Digital data on cassette recorders, Processing algebraic expressions, A morse code station data handler, Efficient storage of morse characters,..AND LOTS MORE.

Yearly subscription.....\$15.00

Ask for BYTE at your local newsagent, or write to,

BYTE PUBLICATIONS (AUST.)

P.O. Box 181, Baulkham Hills 2153.